

KEES
ELEMENTARY
ARITHMETIC



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P 511

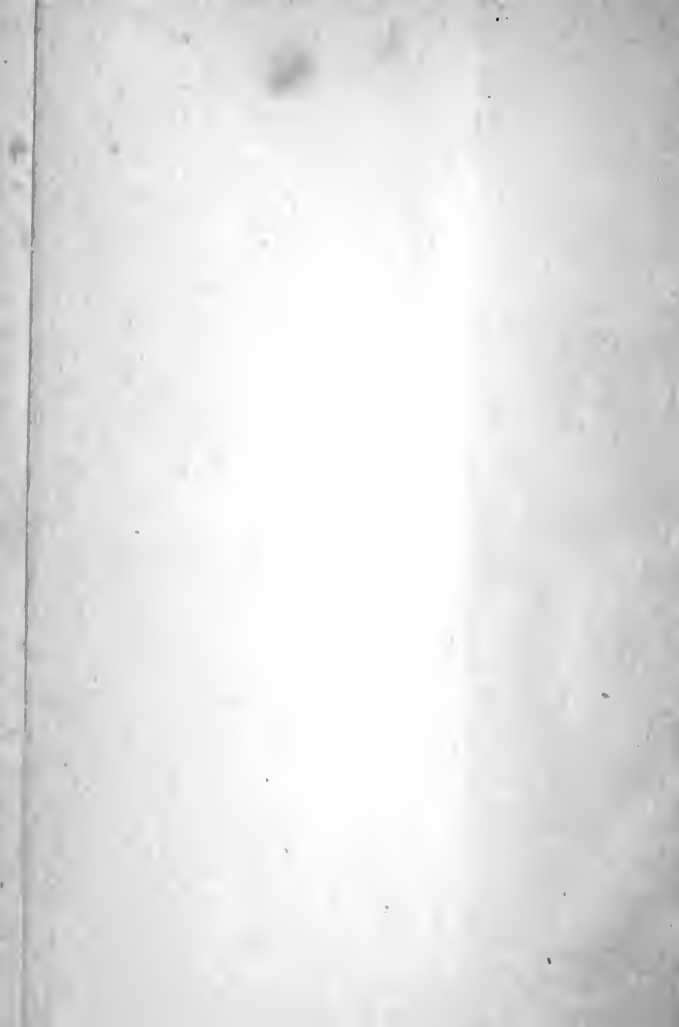
513

1871

5643E

Key

OTC





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K E Y

TO

ELEMENTARY ARITHMETIC, .

FOR

CANADIAN SCHOOLS,

BY

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AND

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UNIVERSITY COLLEGE, TORONTO.

TORONTO:

COPP, CLARK & CO., KING STREET EAST.

1871.

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Minister of Agriculture.

1063

KEY TO

ELEMENTARY ARITHMETIC.

Ex. VI. (p. 17.)

(6)	(7)	(8)
6	2	A's 2
7	$2 + 2 = 4$	B's 5
$6 + 1 = 7$	$4 + 2 = 6$	C's 7
$7 + 2 = 9$	<u> </u>	D's 9
<u> </u>	12 years.	<u> </u>
29 boys.	If C had bought	23
		7 more.
		<u> </u>
		30 total.

Ex. VII. (p. 19.)

(36)	(37)
19	32 men.
$17 + 19 = 36$	$65 + 32 = 97$ women.
$36 + 9 = 45$	$32 + 97 = 129$ youths.
<u> </u>	29 infants.
100 marbles.	<u> </u>
	287

(38)	
659	1st
$657 + 231 = 888$	2d
892	3d
$2437 + 11 = 2448$	4th
4885	5th
<u> </u>	
9770	total.

	(39)	(40)
\$9080 wife's share.		589 1st
\$11788 two younger sons' share.	215+589 =	804 2d
\$10600 eldest son's share.	197+589 =	786 3d
\$10600 three daughters' share.	589+786 =	1375 4th
<u>\$42068</u>		<u>3554</u>

Ex. VIII. (p. 21.)

(21)	(22)	(23)
24916	15499	44821
51954	6824	90323
27499	29620	19096
37750	20325	14669
<u>44720</u>	<u>72268</u>	<u>13743</u>
186839		11555
		<u>194207</u>

Ex. IX. (p. 22.)

(14)	(15)	(16)
44 sheep.	523 bu. wheat.	\$1650
35 cattle.	120 " oats.	160
15 pigs.	64 " peas.	575
6 horses.	237 " potatoes.	200
<u>100 animals.</u>	38 " turnips.	<u>600</u>
	982 total.	\$3185

(17)
25211
32050
31183
28590
23780
<u>24988</u>
165802

Ex. X. (p. 25.)

(30)		(31)
\$560	\$300	75
300	260	28
<hr/>	<hr/>	<hr/>
\$260 w'th of carriage.	\$ 40	47 No. of boys. 19

(32)	(33)
49 + 65 + 19 = 133	6 + 4 = 10
167 - 133 = 34	6 - 4 = 2
65 - 34 = 31	10 - 2 = 8

$$(34)$$

$$10 + 3 + 8 + 5 + 3 + 4 = 33.$$

$$40 - 33 = 7.$$

Ex. XI. (p. 26.)

(22)		(23)
9277 - 1283 = 7994	2d In.	23047
9277 + 7994 = 17271		175
23257 - 17271 = 5986		<hr/>
		23222
		368
		<hr/>
(24)		22854
1869		495
1819		<hr/>
<hr/>		23349
50 the age of the queen <i>now</i> .		132
1841		<hr/>
50		23217
<hr/>		

1891 when the prince's age = the queen's. \therefore the difference is $23217 - 8195 = 15022$.

$1891 - 1819 = 72$ years, the queen's age *then*.

$$(25)$$

$$97 - 29 = 68 \text{ Henry's marbles.}$$

$$97 + 68 - 25 = 140 \text{ Charles' marbles.}$$

<p>(26)</p> <p>84</p> <p>135</p> <p>39</p> <p>58</p> <p>39 + 58 = 97</p> <p>804</p> <hr/> <p>\$1217</p> <p>\$1217 - \$1000 = \$217 in debt.</p>	<p>(27)</p> <p>45 - 16 = 29</p> <p>29 + 7 = 36</p> <p>36 - 10 = 26</p> <p>26 + 2 = 28</p> <p>28 + 4 = 32</p> <p>32 - 11 = 21</p> <p>21 + 9 = 30</p> <p>30 - 7 = 23</p> <p>23 - 5 = 18</p> <p>18 + 8 = 26th from top.</p> <p>45 - 26 = 19th from bottom.</p>
---	---

<p>(28)</p> <p>63 - 5 = 58 children.</p> <p>105 - 58 = 47 able-bodied.</p> <p>70 - 47 = 23 infirm.</p> <p>5 officers.</p>	<p>(29)</p> <p>1769 - 1696 = 73 eggs.</p> <p>1262 - 73 = 1189 nuts.</p> <p>73 + 1189 = 1262</p> <p>1769 - 1262 = 507 oranges</p> <p>1189 - 507 = 682</p>
---	--

(30)

117986

72268

45718

(31)

45003008

37906703

7096305

(32)

Since minuend = sum of subtrahend and remainder,

$\therefore \text{min.} = 56212300 + 77313 = 56289613.$

(33)

Since subtrahend = difference bet. min. and remainder,

$\therefore \text{sub. } 66301000 - 12586 = 66291414.$

<p>(34)</p> <p>Gained \$1 per head.</p> <p>Total gain \$305.</p> <p>$\therefore \text{Actual gain} = \\$305 - \\$45 = \\$260.$</p>	<p>(35)</p> <p>\$43054836</p> <p>34717248</p> <hr/> <p>\$8337588</p>
---	--

Ex. XII. (p. 28.)

(1)

3 = III;	18 = XVIII;	59 = LIX;
7 = VII;	25 = XXV;	62 = LXII;
11 = XI;	28 = XXVIII;	77 = LXXVII;
9 = IX;	37 = XXXVII;	84 = LXXXIV;
12 = XII;	40 = LX;	103 = CIII;
16 = XVI;	53 = LIII;	157 = CLVII;
190 = CXC;	200 = CC;	
651 = DCLI;	783 = DCLXXXIII;	
1204 = MCCIV;	1527 = MDXXVII;	
1865 = MDCCCLXV.		

(2)

III = three, or 3;	VI = six, 6;
VIII = eight, or 8;	XIII = thirteen, or 13;
XV = fifteen, or 15;	XVII = seventeen, or 17;
XX = twenty, or 20;	LIV = fifty-four, or 54;
LXXXI = eighty-one, or 81;	
CXI = one hundred and eleven, or 111;	
DCV = six hundred and five, or 605;	
<u>VII</u> = five thousand and two, or 5002;	
<u>MC</u> = one million one hundred thousand, or 1100000;	
MM = two thousand, or 2000;	
DCCXLIX = seven hundred and forty-nine, or 749;	
MDCCCLXV = one thousand eight hundred and sixty-five, or 1865.	

Ex. XIII. (p. 31.)

(45)

$$39 \times 11 = 429 \text{ bu.}$$

$$429 \times 6 = 2574 \text{ s.}$$

(46)

$$21 \times 12 = 252 \text{ pence.}$$

$$252 \times 3 = 756 \text{ pence.}$$

$$252 \times 7 = 1764 \text{ pence.}$$

$$252 \times 12 = 3024 \text{ pence.}$$

(47)

$$11 \times 23 = 253 \text{ cents.}$$

$$33 \times 9 = 297 \text{ cents.}$$

$$297 - 253 = 44 \text{ cents.}$$

(48)

$$12 \times 12 + 8 = 152.$$

$$8 \times 12 + 12 = 108.$$

$$152 - 108 = 44.$$

(49)

$$\begin{aligned}
 57 \times 12 + 5 &= 689 \text{ B's share.} \\
 112 \times 12 + 11 &= 1355 \text{ C's share.} \\
 259 \times 12 + 9 &= 3117 \text{ D's share.} \\
 689 + 1355 + 3117 &= 5161. \\
 7401 - 5161 &= 2240 \text{ E's share.} \\
 2240 - 1355 &= 885.
 \end{aligned}$$

Ex. XIV. (p. 32.)

(18) 1st travels 93 miles per day, and 2d 79; therefore, in one day he gains $93 - 79$, or 14 miles, and in a week, or seven days, he would gain 14×7 , or 98 miles.

(19) At the end of two days, the first will have gained 14×2 , or 28 miles; then second travels in an opposite direction 5 days, or 5×79 miles = 395, while first is traveling from him 5×93 miles, or 465 miles. Therefore, whole distance apart at the end of 7 days = $28 + 395 + 465$ miles = 888 miles.

Ex. XV. (p. 34.)

(19)	(20)	(21)	(22)
495	690	417	278
370	480	739	900
<hr/>	<hr/>	<hr/>	<hr/>
34650	55200	3753	250200
1485	2760	1251	
<hr/>	<hr/>	2919	
183150	331200	<hr/>	
		308163	
<hr/>			
(23)	(24)	(25)	
904	3259	15900	
803	497	3300	
<hr/>	<hr/>	<hr/>	
2712	22813	477	
7232	29331	477	
<hr/>	<hr/>	<hr/>	
725912	13036		
	<hr/>		
	1619723		
			52470000

(26)	(27)	(28)
50738	86370	47672
9706	90900	5126
<hr/>	<hr/>	<hr/>
304428	77733	286032
355166	77733	95344
456642	<hr/>	47672
<hr/>	7851033000	238360
492463023		<hr/>
		244366672
<hr/>	<hr/>	<hr/>
(29)	(30)	(31)
63190	45094	56888
2065	7838	6049
<hr/>	<hr/>	<hr/>
340545	360752	511992
403654	135282	227552
136218	360752	341328
<hr/>	315658	<hr/>
140645085	<hr/>	344115512
	353446772	
<hr/>	<hr/>	<hr/>
(32)	(33)	(34)
92935	84009	678000
8007	7898	876000
<hr/>	<hr/>	<hr/>
644245	672072	4068
736280	756081	4746
<hr/>	672072	5424
73624245	588063	<hr/>
	<hr/>	593928000000
	663503082	
<hr/>	<hr/>	<hr/>
(35)	(36)	
90058	80108	
90009	7770	
<hr/>	<hr/>	
810522	560756	
810522	560756	
<hr/>	560756	
8106030522	<hr/>	
	622439160	

7039	(37)	3910
4709		350000
<hr/>		<hr/>
63351		1955
49273		1173
28156		<hr/>
<hr/>		1368500000
33146651		
		7008005
87900		400703
9006		<hr/>
<hr/>		21024015
5274		49056035
7911		28032020
<hr/>		<hr/>
791627400		2808128627515

(38)

Sum of 496 and 312 = 808

Diff. of 496 and 312 = 184

3232
6464
808

148672 product.

(39)

(¹) 973	973	(²) 33000	33000
63	3	1560	13
<hr/>	<hr/>	<hr/>	<hr/>
2919	2919	198	99
5838	3	165	33
<hr/>	<hr/>	33	<hr/>
61299	8757	<hr/>	429000
	7	51480000	5
<hr/>	<hr/>		<hr/>
61299			2145000
			4
			<hr/>
			8580000
			6
			<hr/>
			51480000

(40)

1263	5613	96732	67628
3	2	3	2
<hr/>	<hr/>	<hr/>	<hr/>
3789	11226	290196	135256
2	3	4	4
<hr/>	<hr/>	<hr/>	<hr/>
7578	33678	1160784	541024
6	9	6	8
<hr/>	<hr/>	<hr/>	<hr/>
45468	303102	6964704	4328192

Ex. XVI. (p. 34.)

(1)	(2)	(3)
78689	275832	729817
547	476	6736
<hr/>	<hr/>	<hr/>
550823	1654992	4378902
314756	1930824	2189451
393445	1103328	5108719
<hr/>	<hr/>	<hr/>
43042883	131296032	4378902
		<hr/>
		4916047312
 (4)	 (5)	 (6)
46481	40930	9264397
936	779	9584
<hr/>	<hr/>	<hr/>
278886	36837	37057588
139443	28651	74115176
418329	28651	46321985
<hr/>	<hr/>	<hr/>
43506216	31884470	83379573
		<hr/>
		88789980848

(7) 6707936 9878	(8) 6078908 6725	(9) 708670567 97803
53663488	30394540	4252023402
46955552	12157816	5669364536
53663488	42552356	4900693969
60371424	36473448	6378035103
66260991808	40380656300	69312233476002
(10) 6835675 2689	(11) 27083679 3709	(12) 25058612 6289
61521075	243753111	225527508
54685400	189585753	200468896
41014050	81251037	50117224
13671350	100453365411	150351672
18381130075		157592610868
(13) 3523725 2538	(14) 2778588 9867	(15) 79068025 1386
28189800	19450116	494408150
10571175	16671528	632544200
17618625	22228704	237204075
7047450	25007292	79068025
8943214050	27416327796	109588282650
(16) 79094451 764095		(17) 5076812 97613
395472255		15230436
711850059		5076812
316377804		30460872
474366706		35537684
553661157		45691308
60435674536845		495562849756

$$\begin{array}{r}
 (18) \\
 9507340 \\
 \underline{7071} \\
 950734 \\
 6655138 \\
 \underline{6655138} \\
 67226401140
 \end{array}$$

$$\begin{array}{r}
 (19) \\
 12481630 \\
 \underline{1509} \\
 11233467 \\
 6240815 \\
 \underline{1248163} \\
 18834779670
 \end{array}$$

Ex. XVII. (p. 38.)

$$\begin{array}{r}
 (13) \\
 12) 800709 \\
 \hline
 \end{array}$$

$$66725 \frac{9}{2}$$

$$11) 218581$$

$$\hline 19871$$

$$\begin{array}{l}
 (14) \\
 \text{Divisor} = \text{dividend} - \text{rem'r} \div \text{quotient.} \\
 \therefore \text{divisor} = 84 - 3 \div 9 = 9. \\
 \text{Dividend} = \text{divisor} \times \text{quotient} + \text{rem'r.} \\
 \therefore \text{dividend} = 11 \times 146 + 7 = 1613.
 \end{array}$$

(15)

Cost of fowls $11 \times 36 = 396$ cts.
 Selling price 396 cts. $+ 198$ cts. $= 594$ cts.
 Selling price per fowl $594 \div 11 = 54$ cts.

$$(16) \quad 9) 214$$

$$\hline$$

$$23 - 7 \text{ rem'r.}$$

(17)

$$\begin{array}{l}
 \text{Greater No.} = 4563 - 9 = 4554. \\
 \therefore \text{quotient} = 4554 \div 9 = 506.
 \end{array}$$

(18)

$$\begin{array}{r}
 40687 \\
 \underline{503} \\
 122061 \\
 \underline{203435} \\
 20465561
 \end{array}$$

$$\begin{array}{r}
 11) 93710562 \\
 \hline
 8519142
 \end{array}$$

$$20465561 \therefore \text{diff.} = 20465561 - 8519142 = 11946419.$$

(19)

$\$5427 - \$1500 = \$3927$.
 Suppose cook's share = 1.
 Then man-servant's sh. = 2.
 Housekeeper's share = 4.
 \therefore total shares, 7.

$$\$3927 \div 7 = \$561.$$

$$\$561 \times 1 = \text{cook's share.}$$

$$\$561 \times 2 = \$1122, \text{ man-servant's share.}$$

$$\$561 \times 4 = \$2244, \text{ housekeeper's share.}$$

(20)

$$\text{Sum of 18 and 30} = 48.$$

$$\text{Diff. bet. 18 and 30} = 12.$$

$$48 \div 12 = 4.$$

$$\text{Product of 16 and } 27 =$$

$$432. \quad 432 \times 4 = 1728.$$

(21)

$$\begin{array}{r}
 907057 \\
 6000006 \\
 \hline
 5442342 \\
 5442342 \\
 \hline
 5442347442342
 \end{array}$$

$$9) 5442347442342$$

$$604705271371-3$$

$$9 - 3 = 6.$$

(22)

$$282 - 230 = 52.$$

$$\therefore \text{No. of oranges} = 52 \div 2 = 26.$$

(23)

$$\text{Cost of penholders } 4 \times 12 \times 10 = 480 \text{ cts.}$$

$$\text{No. of envelopes } 25 \times 20 = 500.$$

$$500 @ 16 \text{ cts. per hundred} = 16 \times 5 = 80 \text{ cts.}$$

$$480 + 80 = 560 \text{ cts.}$$

$$\therefore \text{No. of penknives} = 560 \div 16 = 35.$$

Ex. XVIII. (p. 41.)

(7)

$$\begin{array}{r}
 256) 88832 (347 \\
 \underline{768} \\
 1203 \\
 \underline{1024} \\
 1792 \\
 \underline{1792}
 \end{array}$$

$$\begin{array}{r}
 308) 175252 (569 \\
 \underline{1540} \\
 2125 \\
 \underline{1848} \\
 2772 \\
 \underline{2772}
 \end{array}$$

$$\begin{array}{r}
 104) 321776 (3094 \\
 \underline{312} \\
 977 \\
 \underline{936} \\
 416 \\
 \underline{416}
 \end{array}$$

(8)

329) 653723 (1987	506) 3577926 (7071	834) 542100 (650
329	3542	5004
<hr/>	<hr/>	<hr/>
3247	3592	4170
2961	3542	4170
<hr/>	<hr/>	<hr/>
2862	506	
2632	506	
<hr/>		
2303		
2303		

(9)

909) 8189181 (9009	745) 4049820 (5436	883) 342604 (388
8181	3725	2649
<hr/>	<hr/>	<hr/>
8181	3248	7770
8181	2980	7064
	<hr/>	<hr/>
	2682	7064
	2235	7064
	<hr/>	
	4470	
	4470	

(10)

365) 7848600 (21503	678) 2339100 (3450	727) 90625 (124
730	2034	727
<hr/>	<hr/>	<hr/>
548	3051	1792
365	2712	1454
<hr/>	<hr/>	<hr/>
1836	3390	3385
1825	3390	2908
<hr/>		<hr/>
1100		477
1095		
<hr/>		
5		

(11)

478) 27291888 (57096	397) 30387310 (76542	703) 3273068 (4655
2390	2779	2812
<u>3391</u>	<u>2597</u>	<u>4610</u>
3346	2382	4218
<u>4588</u>	<u>2153</u>	<u>3926</u>
4302	1985	3515
<u>2868</u>	<u>1681</u>	<u>4118</u>
2868	1588	3515
	<u>930</u>	<u>603</u>
	794	
	<u>136</u>	

(12)

843) 87624792 (103944	609) 53006751 (87039	513) 90273189 (175971
843	4872	513
<u>3324</u>	<u>4286</u>	<u>3897</u>
2529	4263	3591
<u>7957</u>	<u>2375</u>	<u>3063</u>
7587	1827	2565
<u>3709</u>	<u>5481</u>	<u>4981</u>
3372	5481	4617
<u>3372</u>		<u>3648</u>
3372		3591
		<u>579</u>
		513
		<u>66</u>

(Continued on next page.)

(12 continued.)

609) 53006751 (87039

4872

4286

4263

2375

1827

5481

5481

358) 30073074 (84003

2864

1433

1432

1074

1074

652) 630763540981 (967427210

5868

4396

3912

4842

4564

2785

2608

1774

1304

4700

4564

1369

1304

658

652

61

(13)

2731) 519387042 (190182

2731

24628

24579

4970

2731

22394

21848

5462

5462

3076) 154725876 (50301

15380

9258

9228

3076

3076

7243) 632798014 (87366

57944

53358

50701

26570

21729

48411

43458

49534

43458

6076

(14)

1004) 2015029 (2007

2008

7029

7028

1

6487) 131686100 (20300

12974

19461

19461

(Continued on next page.)

(14 continued.)

6007) 395494875 (65839

36042

85074

30035

50398

48056

23427

18021

54065

54063

2

1617) 50696184 (31352

4851

2186

1617

5691

4851

8408

8085

3234

3234

(15)

5008) 4519559744 (902468

45072

12359

10016

23437

20032

34054

30048

40064

40064

9306) 16322853 (1754

9306

70168

65142

50265

46530

37353

37224

129

(Continued on next page)

(15 continued.)

1579) 23617103000 (14957000

1579

7827

6313

15111

14211

9000

7895

11053

11053

2785) 2106144185 (770071

19145

19164

19145

19418

19145

2735

2735

(16)

3782) 142997420 (37810

11346

29537

26471

30634

30256

3782

3782

5016) 19554707200 (3250450

18048

15067

12032

30350

30080

27072

24064

30080

30080

(Continued on next page.)

(16 continued.)

$$38706) 2828882701578 (73086413$$

270942

119462

116118

334470

309648

248221

232236

159855

154824

50317

38706

116118

116118

(17)

$$257 \times 553 = 142121.$$

$$142121 \div 79 = 1799.$$

(18)

$$\text{Cost of gloves, } 9 \times 12 \times 110 = 11880 \text{ cts.}$$

$$\therefore \text{No. of pairs stockings} = 11880 \div 66 = 180.$$

(19)

$$30984051 \div 288 = 107583; \text{ rem'r } 147.$$

$$\therefore \text{No. to be added} = 288 - 147 = 141.$$

(20)

$$274 + 108 = 382.$$

$$274 - 108 = 166.$$

$$382 \times 166 = 63412.$$

$$63412 \div 176 = 360; \text{ rem'r } 52.$$

(21)

$$\left. \begin{array}{l} 75 \times \$4 = \$300 \\ 94 \times \$3 = \$282 \\ 106 \times \$2 = \$212 \end{array} \right\} = \$794.$$

He wishes to realize $\$794 + \147 , or $\$941$.

$$\$941 \div 275 (\text{whole No. of sheep}) = \$3\frac{1}{4}\frac{1}{5}.$$

(22) Gain, \$267
 Buying price, \$1068 - \$267 = \$801
 $\$801 \div 267 = \3 .

(23) $103 + 29 + 267 = 399$.
 $399 \div 19 = 21$.
 $21 \times 57 = 1197$.
 $1197 - 197 = 1000$.

(24) 1 lamb is worth $16 \div 8 = \$2$.
 1 sheep is worth $60 \div 15 = \$4$.
 840 lambs cost $840 \times \$2 = \1680 .
 \therefore No. of sheep = $\$1680 \div 4 = 420$.

(25)

$87403 - 355 = 87048$.
 $87048 \div 216 = 403$.

(26)

$154979552 \div 416 = 372547$.

(27)

$479632 - 20 = 479612$.
 $479612 \div 28 = 17129$.

(28)

Cost of keeping 29 bullocks 3 months @ \$5 = \$435.
 $\therefore \$1885 + \$435 = \$2320 =$ whole cost.
 $\therefore \$2610 - \$2320 = \$290 =$ whole gain.
 $\therefore \$290 \div 29 = \$10 =$ gain per bullock.

Ex. XIX. (p. 43.)

(4)

9067) 806753245 (88976 $\frac{7853}{9067}$

72536

81393

72536

88572

81603

69694

63469

62255

54402

7853

(5)

70602) 612709066 (8678 $\frac{11010}{70602}$

564816

478930

423612

553186

494214

589726

564816

24910

(6)

896) 60005836 (66970 $\frac{716}{896}$ 5376

6245

5376

8698

8064

6343

6272716

(7)

9986) 70867509 (7096 $\frac{6853}{9986}$ 69902

96550

89874

66769

599166853

(8)

868) 8673456954 (9992461 $\frac{806}{868}$ 7812

8614

7812

8025

7812

2136

1736

4009

3472

5375

5208

1674

868806

(9)

93256) 200006783 (2144 $\frac{65919}{93256}$ 186512

134947

93256

416918

373024

438943

37302465919

(10)

$$\begin{array}{r}
 14609 \\
 719 \\
 \hline
 131481 \\
 14609 \\
 102263 \\
 \hline
 10503871
 \end{array}$$

$$\begin{array}{r}
 8067) 10503871 (1302 \frac{537}{8067} \\
 \underline{8067} \\
 24368 \\
 \underline{24201} \\
 16771 \\
 \underline{16134} \\
 637
 \end{array}$$

Ex. XX. (p. 51.)

$$\begin{array}{r}
 (1) \\
 \begin{array}{rcl}
 \text{£} & \text{s.} & \text{d.} \\
 709 & 16 & 8 \\
 20 & & \\
 \hline
 14196 & \text{s.} & \\
 12 & & \\
 \hline
 170360 & \text{d.} & \\
 4 & & \\
 \hline
 681440 & \text{q.} &
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 (2) \\
 \begin{array}{rclcl}
 \text{mls.} & \text{fur.} & \text{ft.} & \text{in.} & \\
 17 & 1 & 2 & 6 & \\
 8 & & & & \\
 \hline
 137 & \text{fur.} & & & \\
 40 & & & & \\
 \hline
 5480 & \text{poles.} & & & \\
 5\frac{1}{2} & & & & \\
 \hline
 27400 & & & & \\
 2740 & & & & \\
 \hline
 30140 & \text{yds.} & & & \\
 3 & & & & \\
 \hline
 90422 & \text{ft.} & & & \\
 12 & & & & \\
 \hline
 1085070 & \text{in.} & & &
 \end{array}
 \end{array}$$

	(3)
tons.	cwt. qrs. lbs.
8	2 3 5
20	
<hr/>	
162 cwt.	
4	
<hr/>	
651 qrs.	
25	
<hr/>	
3260	
1302	
<hr/>	
16280 lbs.	
16	
<hr/>	
97680	
16280	
<hr/>	
260480 oz.	
16	
<hr/>	
1562880	
260480	
<hr/>	
4167680 drs.	

	(4)
ac.	r. sq.p. s.yd.
612	2 0 27½
4	
<hr/>	
2450 r.	
40	
<hr/>	
98000 p.	
30½	
<hr/>	
2940027½	
24500	
<hr/>	
2964527½ yds.	
9	
<hr/>	
26680747½ ft.	
144	
<hr/>	
106722988	
106722988	
26680747	
<hr/>	
3842027568	
72	
<hr/>	
3842027640 in.	

(5)							(6)			
mls.	fur.	po.	yds.	ft.	in.	ls.	ac.	r.	per.	yds.
10	5	5	5	0	5	5	5	0	3	29
8							4			
<hr/>							<hr/>			
85	fur.						20	r.		
40							40			
<hr/>							<hr/>			
3405	p.						803	p.		
5½							30½			
<hr/>							<hr/>			
17030							24119			
1702½							200¾			
<hr/>							<hr/>			
18732½	yds.						24319¾	yds.		
3							9			
<hr/>							<hr/>			
56197½							218877¾	ft.		
12							144			
<hr/>							<hr/>			
674375	ft.						875508			
12							875508			
<hr/>							<hr/>			
8092595	in.						218877			
							<hr/>			
							31518288			
							108			
							<hr/>			
							31518396			

(7)
 17 days.
 24
 —
 68
 34
 —
 408 hrs.
 60
 —
 24480 min.

lbs.	oz.	(8) drs.	scr.	grs.	(9) lea.	mls. fur.
2	11	0	0	20	2	7
12					3	
<hr/>					<hr/>	
35	oz.				8	mls.
8					8	
<hr/>					<hr/>	
280	drs.				71	fur.
3					40	
<hr/>					<hr/>	
840	scr.				2840	per.
20					5½	
<hr/>					<hr/>	
16820	grs.				14200	
					1420	
<hr/>					<hr/>	
cub.yds.	(10) ft.		in.		15620	yds.
23	0		1000			
27						
<hr/>					<hr/>	
161					(11) galls.	qts.
46					13	3
<hr/>					<hr/>	
621	ft.				55	qts.
1728					2	
<hr/>					<hr/>	
5968					110	pts.
1242					4	
4347					<hr/>	
621					440	gills.
<hr/>					<hr/>	
1074088	in.		(12) 220 bush.			
			4			
<hr/>						
			880 pks.			
			2			
<hr/>						
			1760 galls.			
			4			
<hr/>						
			7040 qts.			

$$\begin{array}{r}
 (13) \\
 \text{yrs.} \quad \text{dys.} \\
 3 \quad 315 \\
 365 \\
 \hline
 15 \\
 18 \\
 9 \\
 \hline
 1095 \\
 315 \\
 \hline
 1410 \text{ dys.} \\
 24 \\
 \hline
 5640 \\
 2820 \\
 \hline
 33840 \text{ hrs.} \\
 60 \\
 \hline
 2030400 \text{ min.}
 \end{array}$$

$$\begin{array}{r}
 (14) \\
 \text{lbs.} \quad \text{oz.} \quad \text{dwt.} \\
 27 \quad 5 \quad 16 \\
 12 \\
 \hline
 329 \text{ oz.} \\
 20 \\
 \hline
 6596 \text{ dwt.} \\
 24 \\
 \hline
 26384 \\
 13192 \\
 \hline
 158304 \text{ grs.}
 \end{array}$$

$$\begin{array}{r}
 (15) \\
 \text{lbs.} \quad \text{oz.} \quad \text{drs.} \quad \text{sc.} \\
 47 \quad 11 \quad 6 \quad 2 \\
 12 \\
 \hline
 575 \text{ oz.} \\
 8 \\
 \hline
 4606 \text{ drs.} \\
 3 \\
 \hline
 13820 \text{ sc.} \\
 20 \\
 \hline
 276400 \text{ gr.}
 \end{array}$$

$$\begin{array}{r}
 (16) \\
 \text{£} \quad \text{s.} \quad \text{d.} \\
 200 \quad 17 \quad 8\frac{1}{2} \\
 20 \\
 \hline
 4017 \text{ s.} \\
 12 \\
 \hline
 48212 \text{ d.} \\
 2 \\
 \hline
 96425 \frac{1}{2} \text{ d.}
 \end{array}$$

(17)
 ac. r.
 219 2 per.
 4 16
 —
 878 ro.
 40
 —
 35136 per.
 30½
 —
 1054080
 8784
 —
 1062864 yds.

(19)
 £ s. d.
 2376 19 8½
 20
 —
 47539 s.
 12
 —
 570476 d.
 4
 —
 2281906 q.

(18)
 yds. qrs. nls.
 218 2 3
 4
 —
 874 qrs.
 4
 —
 3490 nls.

(20)
 cwt. qrs. lbs.
 216 2 17
 4
 —
 866 qrs.
 25
 —
 4347
 1732
 —
 21667 lbs.

(21)
 25° 36'
 60
 —
 1536'
 60
 —
 92160'

(22)				(23)	
mls.	fur.	per.	yds.	£	s. d.
8	3	0	4	312	17 6½
8				20	
<hr/>				<hr/>	
67	fur.			6257	s. (24)
40				12	lbs.
<hr/>				<hr/>	
2680	per.			75090	d. 105
5½				4	12
<hr/>				<hr/>	
13404				300362	q. 1260 oz.
1340					20
<hr/>				<hr/>	
14744	yds.		(25)		25200 dwt.
3			E. ells.		24
<hr/>				<hr/>	
44232	ft.		26		100800
12			5		50400
<hr/>				<hr/>	
530784	in.		130 qrs.		604800 grs.
			4		
<hr/>				<hr/>	
			520 nls.	(27)	
				£	s. d.
				576	0 6½
				20	
				<hr/>	
		(26)		11340	s.
		Fr. ells.		12	
		37			
		6			
<hr/>				<hr/>	
(28)		222 qrs.		136086	d. (30)
lbs. oz.		4		4	£ s. d.
287 6					200 19 6½
12					20
<hr/>				<hr/>	
3450	oz.				4019 s.
8					12
<hr/>				<hr/>	
27600	drs.		(29)		48234 d.
3			pipes.		4
<hr/>				<hr/>	
82800	sc.		2		
			—		
			6 hhds.		
			63		192938 q.
<hr/>				<hr/>	
			378		galls.

Ex. XXI. (p. 53.)

$$\begin{array}{r} (1) \\ 4) 123290 \\ \hline \end{array}$$

$$12) 30822 - \frac{1}{2} d.$$

$$20) 2568 - s. 6 d.$$

$$\pounds 128 \ 8 s. \ 6\frac{1}{2} d.$$

$$\begin{array}{r} (2) \\ 24) 13172 \\ \hline \end{array}$$

$$20) 548 - 20 \text{ grs.}$$

$$12) 27 - 8 \text{ dwt.}$$

$$2 \text{ lbs. } 3 \text{ oz. } 8 \text{ dwt. } 20 \text{ grs.}$$

$$\begin{array}{r} (3) \\ 2) 18191 \\ \hline \end{array}$$

$$4) 9095 - 1 \text{ pt.}$$

$$2273 \text{ galls. } 3 \text{ qts. } 1 \text{ pt.}$$

$$\begin{array}{r} (4) \\ 12) 76787568 \\ \hline \end{array}$$

$$3) 6398964$$

$$5\frac{1}{2}) 2132988 - \text{yds.}$$

$$\begin{array}{r} 2 \qquad \qquad 2 \\ \hline \end{array}$$

$$11) 4265976$$

$$40) 387816$$

$$8) 9695 - 16 \text{ poles.}$$

$$3) 1211 - 7 \text{ fur.}$$

$$403 \text{ lea. } 2 \text{ mls. } 7 \text{ fur. } 16 \text{ poles.}$$

$$\begin{array}{r} (5) \\ 16) 2007008 \\ \hline \end{array}$$

$$16) 125438$$

$$25) 7839 - 14 \text{ oz.}$$

$$4) 313 - 14 \text{ lbs.}$$

$$20) 78 - 1 \text{ qr.}$$

$$3 \text{ tons. } 18 \text{ cwt. } 1 \text{ qr. } 14 \text{ lbs. } 14 \text{ oz.}$$

$$\begin{array}{r} (6) \\ 40) 93827 \\ \hline \end{array}$$

$$4) 2345 \text{ r.} - 27 \text{ per.}$$

$$586 \text{ a. } 1 \text{ r. } 27 \text{ per.}$$

(7)

$$\begin{array}{r} 24) 167812 \\ \hline \end{array}$$

$$\begin{array}{r} 20) 6992 - 4 \text{ grs.} \\ \hline \end{array}$$

$$\begin{array}{r} 12) 349 - 12 \text{ dwt.} \\ \hline \end{array}$$

$$\begin{array}{r} 29 \text{ lbs. 1 oz. 12 dwt. 4 grs.} \\ \hline \end{array}$$

(8)

$$\begin{array}{r} 12) 8756765637 \\ \hline \end{array}$$

$$\begin{array}{r} 12) 729730469 - 9 \text{ lines.} \\ \hline \end{array}$$

$$\begin{array}{r} 3) 60810872 - 5 \text{ inches.} \\ \hline \end{array}$$

$$\begin{array}{r} 35\frac{1}{2}) 20270290 - 2 \text{ ft.} \\ \hline \end{array}$$

$$\begin{array}{r} 11) 40540580 \\ \hline \end{array}$$

$$\begin{array}{r} 40) 3685507 - 1\frac{1}{2} \text{ yds.} \\ \hline \end{array}$$

$$\begin{array}{r} 8) 92137 - 27 \text{ poles.} \\ \hline \end{array}$$

$$11517 \text{ mls. 1 fur. 27 p. 2 yds. 0 ft. 11in. 9 ls.}$$

(9)

$$\begin{array}{r} 16) 7678678956 \\ \hline \end{array}$$

$$\begin{array}{r} 16) 479917434 - 12 \text{ drs.} \\ \hline \end{array}$$

$$\begin{array}{r} 25) 29994839 - 10 \text{ oz.} \\ \hline \end{array}$$

$$\begin{array}{r} 4) 1199793 - 14 \text{ lbs.} \\ \hline \end{array}$$

$$\begin{array}{r} 20) 299948 - 1 \text{ qr.} \\ \hline \end{array}$$

$$149974 \text{ ts. 8 cwt. 1 qr. 14 lbs. 10 oz. 12 drs.}$$

(10)	(11)
12) 121605	24) 98006
3) 10133 ft. - 9 in.	20) 4083 - 14 grs.
5½) 3377 - 2 ft.	12) 204 - 3 dwt.
2 2	17 lbs. 0 oz. 3 dwt. 14 grs.
11) 6754	
40) 614	
8) 15 - 14 po.	
1 ml. 7 fur. 14 p. 0 yds. 2 ft. 9 in.	
(12)	(13)
16) 2022752	20) 702917
16) 126422	3) 35145 - 17 grs.
25) 7901 - 6 oz.	8) 11715 - 0 sc.
4) 316 - 1 lb.	12) 1464 - 3 dr.
20) 79 - 0 qrs.	122 lb. 0 oz. 3 dr. 0 sc. 17 gr.
3 tons. 19 cwt. 0 qrs. 1 lb. 6 oz.	
(14)	(15)
69) 1727893	30½) 172425
69) 28798 - 13 sec.	4 4
24) 479 - 58 min.	121) 689700
7) 19 - 23 hrs.	49) 5709 sq. poles.
2 wk. 5 dy. 23 hr. 58' 13''	4) 142 r. - 20 sq. poles.
	35 a. 22 r. 20 sq. po.

$$\begin{array}{r} (16) \\ 1728) 13856832 \\ \hline \end{array}$$

27) 8019 cub. ft.

297 cub.yds.

$$\begin{array}{r} (18) \\ 4) 500 \\ \hline \end{array}$$

$$\begin{array}{r} 4) 125 \\ \hline \end{array}$$

31 yds. 1 qr.

$$\begin{array}{r} (17) \\ 144) 1244160000 \\ \hline \end{array}$$

9) 8640000 sq. ft.

$$\begin{array}{r} 30\frac{1}{4}) 960000 \\ \hline 4 \qquad 4 \end{array}$$

$$\begin{array}{r} 121) 3840000 \\ \hline \end{array}$$

40) 31735—16 $\frac{1}{4}$ sq. yds.

4) 793 r.—15 sq. per.

198 a. 1 r. 15 s.p. 16 $\frac{1}{4}$ s.yds

$$\begin{array}{r} (19) \\ 60) 131073 \\ \hline \end{array}$$

60) 2184 min.—35 sec.

36 hrs. 24 min. 35 sec.

$$\begin{array}{r} (20) \\ 60) 31557609 \\ \hline \end{array}$$

60) 525960 min.

24) 8766 hrs.

365 dys. 6 hrs.

$$\begin{array}{r} (21) \\ 2) 219612 \\ \hline \end{array}$$

4) 109806 qts.

54) 27451 galls. 2 qts.

508 hhds. 19 gals. 2 qts.

$$\begin{array}{r} (22) \\ 2) 300738 \\ \hline \end{array}$$

4) 150369 qts.

63) 37592 galls. 1 qt.

596 hhds. 44 gals. 1 qt.

$$\begin{array}{r} (23) \\ 60) 912715 \\ \hline \end{array}$$

15211 bu. 55 lbs.

$$\begin{array}{r} (24) \\ 34) 1000000 \\ \hline \end{array}$$

29411 bu. 26 lbs.

$$\begin{array}{r} (25) \\ 60) 7263 \\ \hline \end{array}$$

121 bu. 3 lbs.

(26)
\$307.47

(27)
4)973647

12)243411 d.—3 q.

20)20284 s.—3 $\frac{1}{2}$ d.

£1014 . 4 s. 3 $\frac{1}{2}$ d.

Ex. XXV. (p. 59.)

(15)

lbs.	oz.	dwt.	grs.
6	2	3	17 × 2
			10

(16)

£	s.	d.
13	7	4 $\frac{1}{2}$
		11

61	9	17	2 × 8
			10

147	1	4 $\frac{1}{2}$
		5

618	2	10	20 × 3
			10

735	6	9 $\frac{1}{2}$
		5

6182	1	8	8
			5

3076	13	10 $\frac{1}{2}$
------	----	------------------

30910	7	1	16
-------	---	---	----

1854	7	12	12
------	---	----	----

494	6	16	16
-----	---	----	----

12	4	7	10
----	---	---	----

33272	1	18	6
-------	---	----	---

(17)

ac.	r.	per.	yds.	ft.	in.
20	2	17	15	3	3
					8

164	3	20	1	6	24
					8

1313	0	0	13	4	48
------	---	---	----	---	----

(18)						
mls.	fur.	per.	yds.	ft.	in.	
2	6	2	3	0	5	5
<hr/>						
13	6	12	4	2	1	5
<hr/>						
68	7	24	1	1	1	5
<hr/>						
344	6	1	1½	1	1	3
<hr/>						
1034	2	4	0	0	3	

(19)		
£	s.	d.
2	6	8½
<hr/>		
23	6	10½
<hr/>		
233	8	9
<hr/>		
2100	18	9

(20)	(21)
\$237.15	bu. pk. galls.
100	10 2 1
<hr/>	
\$23715.00	106 . 1 . 0
5	10
<hr/>	
\$118575.00	1062 . 2 . 0
<hr/>	
	8
<hr/>	
	8500 . 0 . 0

Ex. XXVI. (p. 61.)

(1)				(2)			
cwt.	qrs.	lbs.	oz.	lbs.	oz.	dwt.	grs.
3	3	21	5	6	2	3	17
			10				10
39	2	13	2	61	9	17	2
			8				10
317	0	5	0	618	2	10	20
35	2	16	13				10
352	2	21	13	6182	1	8	8
							5
				30910	7	1	16
				2472	10	3	8
				370	11	2	12
				18	6	11	3
				33772	10	18	15

(3)			(4)				
£	s.	d.	cwt.	qrs.	lbs.	oz.	drs.
2	6	9½	2	3	23	6	7
		10					10
23	7	11	29	3	9	0	6
		10					10
233	19	2	298	1	15	3	12
		9					6
2105	12	6	1790	1	16	6	8
70	3	9	59	2	18	0	12
18	14	4	20	3	13	13	1
2194	10	7	1870	3	23	4	5

(5)		
£	s.	d.
4	18	9½ 10
<hr/>		
49	7	11 10
<hr/>		
493	19	2 5
<hr/>		
2469	15	10
296	7	6
4	18	9½
<hr/>		
2771	2	1½

(6)				
lbs.	oz.	drs.	sc.	grs.
15	2	3	2	7 10
<hr/>				
152	0	5	2	10 10
<hr/>				
1520	7	2	1	0 7
<hr/>				
10644	3	0	1	0
152	0	5	2	10
30	4	7	1	14
<hr/>				
10826	8	5	2	4

(7)
\$2.25
209
<hr/>
2025
450
<hr/>
\$470.25

(8)
\$1.27
52
<hr/>
254
635
<hr/>
\$66.04

(9)
1625 cts.
6
<hr/>
\$97.50

(10)			
qrs.	lbs.	oz.	
1	17	8 10	
<hr/>			
17	0	0 2	
<hr/>			
34	0	0	
15	7	8	
<hr/>			
cwt. 12	1	7	8

(11)
100000
40
<hr/>
\$10000.00

Ex. XXVII. (p. 63.)

(1)			(2)			
£	s.	d.	lbs.	oz.	dwt.	grs.
5) 278	15	8	8) 237	5	6	0
<hr/>			<hr/>			
55	15	1 $\frac{3}{4}$	29	8	3	6

(3)					
mls.	fur.	per	yds.	ft.	in.
9) 217	5	16	2	0	0
<hr/>					
24	1	19	3	10	10

(4)			(5)			
yds.	qrs.	mls.	lbs.	oz.	drs.	sc. grs.
5) 115	2	2	6) 865	9	0	2
<hr/>			<hr/>			
23	0	2	144	3	4	0
						8 $\frac{2}{3}$ = $\frac{1}{3}$

(6)			(7)			
£	s.	d.	tons.	cwt.	qrs.	lbs.
11) 2078	17	11 $\frac{1}{2}$	9) 67	13	1	17
<hr/>			<hr/>			
188	19	9 $\frac{3}{4}$	5) 7	10	1	13
						0
						2
						10
						10
						10 $\frac{2}{3}$

(8)					
ac.	rds.	per.	yds.	ft.	in.
7) 976	2	19	25	0	0
<hr/>					
8) 139	2	2	25	1	87-3 rem.
<hr/>					
17	1	30	10	6	55-7 rem.
					7 × 7 + 3 = 52, true rem.
					$\frac{52}{60} = 1\frac{3}{5}$.

(9)			(10)		
cwt.	qrs.	lbs.	oz.	drs	
705) 612	0	17	0	2	(3 qrs.
4					
2448					
2115					
333					
25					
1682					
666					
8342 (11 lbs.					
705					
1292					
705					
587					
16					
3522					
587					
9392 (13 oz.					
705					
2342					
2115					
227					
16					
1364					
227					
3634 ($5\frac{1}{2}$ drs.					
3525					
109					

1247) 8627 mls. fur. yds.
6 2 (7 fur.

7482

1145

8

9166

8729

437

40

17480 (14 per.

1247

5010

4988

22

$5\frac{1}{2}$

112

11

123 (0 yds.

3

369 (0 ft.

12

4428 ($3\frac{1}{2}$ in.

3741

687

Ans.—7 fur. 14 per. $3\frac{1}{2}$ in.
Ans.—3 qrs. 11 lbs. 13 oz. $5\frac{1}{2}$ drs.

(11)

	bu.	pks.	gall.	qts.	pts.	
12)	612	2	1	2	0	
<hr/>						
8)	51	0	0	1	1	rem. -8
<hr/>						
	6	1	1	0	0	rem. -3
	$3 \times 12 + 8 = 44, \text{ true rem.}$					

(12)

	£	s.	d.
9)	2851	16	4½
<hr/>			
6)	316	17	4½
<hr/>			
	52	16	2½

(13)

	lbs.	oz.	drs.	sc.	grs.
57)	247	10		1	0 (4 lbs.
	228				
	<hr/>				
	19				
	12				
	<hr/>				
	238	(4 oz.			
	228				
	<hr/>				
	10				
	8				
	<hr/>				
	87	(1 dr.			
	57				
	<hr/>				
	30				
	3				
	<hr/>				
	91	(1 sc.			
	57				
	<hr/>				
	34				
	20				
	<hr/>				
	680	(11½ grs.			
	627				
	<hr/>				
	53				

Ans.—4 lbs. 4 oz. 1 dr. 1 sc. 11½ grs.

$$\begin{array}{r}
 (14) \\
 \text{mfs.} \quad \text{fur.} \quad \text{per.} \\
 211) 200 \quad . \quad 3 \quad . \quad 6 (7 \text{ fur.} \\
 \quad \quad \quad 8
 \end{array}$$

$$\begin{array}{r}
 1603 \\
 1477 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 126 \\
 40 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 5046 (23 \text{ per.} \\
 422 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 826 \\
 633 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 193 \\
 5\frac{1}{2} \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 965 \\
 96\frac{1}{2} \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 1061\frac{1}{2} (5 \text{ yds.} \\
 1055 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 6\frac{1}{2} \\
 3 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 19\frac{1}{2} \\
 12 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 234 (1 \text{ in.} \\
 211 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 23 \\
 12 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 276 (1\frac{5}{11} \text{ ls} \\
 211 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 65
 \end{array}$$

Ans.—7 fur. 23 per. 5 yds. 1 in. $1\frac{5}{11}$ ls.

	ac.	r.	(15) per.	yds.
318)	416	3	19	7 (1 ac.
	<u>318</u>			
	98			
	4			
	<u>395</u>	(1 ro.		
	318			
	<u>77</u>			
	40			
	<u>3099</u>	(9 per.		
	2862			
	<u>237</u>			
	30 $\frac{1}{4}$			
	<u>7117</u>			
	59 $\frac{1}{4}$			
	<u>7176$\frac{1}{4}$</u>	(22 yds.		
	636			
	<u>816$\frac{1}{4}$</u>			
	636			<u>4608</u>
	<u>180$\frac{1}{4}$</u>			36
	9			<u>4644</u>
	<u>1622$\frac{1}{4}$</u>	(5 ft.		(14 $\frac{1}{3}$ $\frac{2}{3}$ in.
	1590			318
	<u>32$\frac{1}{4}$</u>			<u>1464</u>
	144			1272
	<u>128</u>			<u>192</u>
	128			318
	32			

Ans.—1 ac. 1 ro. 9 per. 22 yds. 5 ft. $14\frac{1}{3}1\frac{2}{8}$ in.

(16)
 tons. cwt. qrs.
 564) 614 2 3 (1 ton.

564

50

20

1002 (1 cwt.

564

438

4

1755 (3 qrs.

1692

63

25

315

126

1575 (2 lbs.

1128

447

16

2682

447

7152 (12 oz.

564

1512

1128

384

16

2304

2304

384

6144 (10 $\frac{3}{4}$ drs.

5640

504

(17)
 c. yds. c. ft. c. in.
 169) 917 9 100 (5 c. yds.
 845
 ———
 72
 27
 ———

513
 144
 ———

1953 (11 c. ft.
 169
 ———

263
 169
 ———

94
 1728
 ———

852
 188
 ———

658
 94
 ———

162532 (961 $\frac{23}{9}$ c. in.
 1521
 ———

1043
 1014
 ———

292
 169
 ———

123

(18)
 lbs. oz. drs. sc.
 212) 926 5 3 2 (4 lbs.
 848
 ———

78
 12
 ———

941 (4 oz.
 848
 ———

93
 8
 ———

747 (3 drs.
 636
 ———

111
 3
 ———

335 (1 sc.
 212
 ———

123
 20
 ———

2460 (11 $\frac{1}{2}$ $\frac{2}{3}$ grs.
 212
 ———

340
 212
 ———

128

$$\begin{array}{r}
 \text{lbs.} \qquad \text{dwt.} \\
 634) 3068 \qquad 8(4 \text{ lbs.} \\
 \underline{2536} \\
 532 \\
 \underline{12} \\
 6384(10 \text{ oz.} \\
 \underline{6340} \\
 44 \\
 \underline{20} \\
 888(1 \text{ dwt.} \\
 \underline{634} \\
 254 \\
 \underline{24} \\
 1016 \\
 \underline{508} \\
 6096(9\frac{3}{4} \text{ grs.} \\
 \underline{5706} \\
 390
 \end{array}$$

	(20)	
£	s.	d.
758) 1914	10	5 (£2
1516		
<hr/>		
398		
20		
<hr/>		
7970 (10s.		
7580		
<hr/>		
390		
12		
<hr/>		
4685 (6 $\frac{13}{16}$ d.		
4548		
<hr/>		
137		
<hr/>		
Ans.—£2 10s. 6 $\frac{13}{16}$ d.		

	£	s.	d.
317)	215	12	6 $\frac{1}{4}$ (13s. 7 $\frac{1}{4}$ d.)
	20		
	<hr/>		
	4312		
	317		
	<hr/>		
	1142		
	951		
	<hr/>		
	191		
	12		
	<hr/>		
	2298	(7d.	
	2219		
	<hr/>		
	79		
	4		
	<hr/>		
	317	($\frac{1}{4}$ q.	
	317		
Ans.—	13s.	7 $\frac{1}{4}$ d.	

(22)
 yrs. dys. hrs. min.
 397) 125 127 16 47 (115 days.
 365

752

750

375

45752

397

605

397

2082

1985

97

24

404

194

2344 (5 hrs.

1985

359

60

21587 (54 min.

1985

1737

1588

149

60

8940 (22 $\frac{306}{397}$ sc.

794

1000

794

206

(23)

267) \$2267.84 (\$8.49 $\frac{101}{267}$).

2136

1318

1068

2504

2403

101

(24)

425) \$5693.75 (\$13.39 $\frac{102}{425}$).

425

1443

1275

1687

1275

4125

3825

300

Ans.—115 dys. 5 hrs. 54'. 22 $\frac{306}{397}$ '.

$$\begin{array}{r} (25) \\ 365) \$600.00 (\$1.64\frac{1}{3}\frac{1}{3}. \\ \underline{365} \end{array}$$

2350

2190

1600

1460

$$\underline{140} \quad 365 - 52 = 313.$$

$$313) \$600.00 (\$1.91\frac{1}{3}\frac{1}{3}.$$

313

2870

2817

530

313

217

$$\begin{array}{r} (27) \\ 57) \$65.55 (\$1.15 \\ \underline{57} \end{array}$$

85

57

285

285

$$\begin{array}{r} (26) \\ 57) \$265.05 (\$4.65 \\ \underline{228} \end{array}$$

370

342

285

285

$$\begin{array}{r} (28) \\ 52) \$132.00 (\$2.53\frac{1}{2} \\ \underline{104} \end{array}$$

280

260

200

156

44

Ex. XXVIII. (p. 64.)

$$\begin{array}{ll} (1) & (2) \\ \text{£684 7s. 6d.} = 164250\text{d.} & \text{£171 1s. } 10\frac{1}{2}\text{d.} = 82125\frac{1}{2}\text{d.} \\ \text{£76 0s. 10d.} = 18250\text{d.} & \text{£57 0s. } 7\frac{1}{2}\text{d.} = 27375\frac{1}{2}\text{d.} \\ 164250 \div 18250 = 9 \text{ times.} & 82125 \div 27375 = 3 \text{ times.} \end{array}$$

$$(3) \quad 9 \text{ lbs. } 9 \text{ oz. } 3 \text{ dwt. } 12 \text{ grs.} = 56244 \text{ grs.}$$

$$5 \text{ dwt. } 9 \text{ grs.} = 129 \text{ grs.}$$

$$56244 \div 129 = 436 \text{ times.}$$

(4)

$$4 \text{ mls. } 1 \text{ fur. } 2 \text{ yds.} = 21786 \text{ ft.}$$

$$1 \text{ ml. } 3 \text{ fur. } 2 \text{ ft.} = 9262 \text{ ft.}$$

$$21786 \div 9262 = 3 \text{ times.}$$

(5)

$$6 \text{ cwt. } 2 \text{ qrs.} = 10400 \text{ oz.}$$

$$1 \text{ qr. } 3 \text{ oz.} = 403 \text{ oz.}$$

$$10400 \div 403 = 25\frac{3\frac{2}{3}}{10\frac{1}{3}} \text{ times.}$$

(6)

$$12 \text{ lbs. } 6 \text{ oz. } 2 \text{ sc.} = 72040 \text{ gr.}$$

$$1 \text{ lb. } 6 \text{ oz. } 2 \text{ sc. } 10 \text{ grs.} =$$

$$8690 \text{ grs.}$$

$$72040 \div 8690 = 8\frac{2\frac{5}{6}}{8\frac{2}{9}} \text{ times.}$$

(7)

$$3 \text{ yds. } 1 \text{ qr. } 2 \text{ nls.} = 54 \text{ nls. } 1 \text{ dy. } 1 \text{ hr. } 12 \text{ min.} = 1512 \text{ min.}$$

$$1 \text{ qr. } 2 \text{ nls.} = 6 \text{ nls.}$$

$$54 \div 6 = 9 \text{ times.}$$

(8)

$$1 \text{ hr. } 3 \text{ min.} = 63 \text{ min.}$$

$$1512 \div 63 = 24 \text{ times.}$$

(9)

$$5\text{s. per. } 7 \text{ yds. } 108 \text{ in.} = 205200 \text{ in.}$$

$$2 \text{ yds. } 1 \text{ ft.} = 2736 \text{ in.}$$

$$205200 \div 2736 = 75 \text{ times.}$$

(10)

$$\$141.05 = 14105 \text{ cts.}$$

$$\$ 2.17 = 217 \text{ cts.}$$

$$14105 \div 217 = 65 \text{ times.}$$

(11)

$$\$221.00 = 22100 \text{ cts.}$$

$$\$ 2.21 = 221 \text{ cts.}$$

$$22100 \div 221 = 100 \text{ times.}$$

EX. XXIX. (p. 65.)

(1)

$$£25 \times 4 = \$100.00$$

$$6\text{s.} \times 20 = 1.20$$

$$3\text{d.} = 12 \text{ q.} \times 5 \div 12 = .05$$

$$\$101.25$$

(2)

$$£57 \times 4 = \$228.00$$

$$19\text{s.} \times 20 = 3.80$$

$$3\text{d.} = 12 \text{ q.} \times 5 \div 12 = .05$$

$$\$231.85$$

(3)

$$£207 \times 4 = \$828.00$$

$$17\text{s.} \times 20 = 3.40$$

$$8\text{d.} = 32 \text{ q.} \times 5 \div 12 = .13\frac{1}{3}$$

$$\$831.53\frac{1}{3}$$

$$\begin{array}{rcl}
 & (4) & \\
 £153 & \times 4 = & \$612.00 \\
 18s. & \times 20 = & 3.60 \\
 5d. = 20 q. \times 5 \div 12 = & & .08\frac{1}{2} \\
 \hline
 & & \$615.68\frac{1}{2}
 \end{array}$$

$$\begin{array}{rcl}
 (5) & & \\
 £217 & \times 4 = & \$868.00 \\
 17s. & \times 20 = & 3.40 \\
 \hline
 & & \$871.40
 \end{array}$$

$$\begin{array}{rcl}
 (6) & & \\
 £319 & \times 4 = & \$1276.00 \\
 15s. & \times 20 = & 3.00 \\
 7\frac{1}{2}d. = 30 q. \times 5 \div 12 = & & .12\frac{1}{2} \\
 \hline
 & & \$1279.12\frac{1}{2}
 \end{array}$$

$$\begin{array}{rcl}
 (7) & & \\
 £612 & \times 4 = & \$2448.00 \\
 19s. & \times 20 = & 3.80 \\
 11\frac{1}{4}d. = 45 q. \times 5 \div 12 = & & .18\frac{3}{4} \\
 \hline
 & & \$2451.98\frac{3}{4}
 \end{array}$$

$$\begin{array}{rcl}
 (8) & & \\
 £63 & \times 4 = & \$252.00 \\
 9s. & \times 20 = & 1.80 \\
 9\frac{3}{4}d. = 39 q. \times 5 \div 12 = & & .16\frac{1}{4} \\
 \hline
 & & \$253.96\frac{1}{4}
 \end{array}$$

$$\begin{array}{rcl}
 (9) & & \\
 £912 & \times 4 = & \$3648.00 \\
 12s. & \times 20 = & 2.40 \\
 6d. = 24 q. \times 5 \div 12 = & & .10 \\
 \hline
 & & \$3650.50
 \end{array}$$

$$\begin{array}{rcl}
 (10) & & \\
 £711 & \times 4 = & \$2844.00 \\
 5s. & \times 20 = & 1.00 \\
 5\frac{1}{2}d. = 22 q. \times 5 \div 12 = & & .09\frac{1}{6} \\
 \hline
 & & \$2845.09\frac{1}{6}
 \end{array}$$

$$\begin{array}{rcl}
 (11) & & \\
 £1117 & \times 4 = & \$4468.00 \\
 7\frac{1}{2}d. = 30 q. \times 5 \div 12 = & & .12\frac{1}{2} \\
 \hline
 & & \$4468.12\frac{1}{2}
 \end{array}$$

$$\begin{array}{rcl}
 & (12) & \\
 £47 & \times 4 = & \$188.00 \\
 7 \text{ s.} & \times 20 = & 1.40 \\
 9 \text{ d.} = 36 \text{ q.} & \times 5 \div 12 = & .15 \\
 \hline
 & & \$189.55
 \end{array}$$

$$\begin{array}{rcl}
 & (13) & \\
 £2017 & \times 4 = & \$8068.00 \\
 6 \text{ s.} & \times 20 = & 1.20 \\
 8 \text{ d.} = 32 \text{ q.} & \times 5 \div 12 = & .13\frac{1}{3} \\
 \hline
 & & \$8069.33\frac{1}{3}
 \end{array}$$

$$\begin{array}{rcl}
 & (14) & \\
 £75 & \times 4 = & \$300.00 \\
 9 \text{ s.} & \times 20 = & 1.80 \\
 8\frac{1}{2} \text{ d.} = 34 \text{ q.} & \times 5 \div 12 = & .14\frac{1}{6} \\
 \hline
 & & \$301.94\frac{1}{6}
 \end{array}$$

$$\begin{array}{rcl}
 & (15) & \\
 £37 & \times 4 = & \$148.00 \\
 18 \text{ s.} & \times 20 = & 3.60 \\
 7\frac{1}{2} \text{ d.} = 30 \text{ q.} & \times 5 \div 12 = & .12\frac{1}{2} \\
 \hline
 & & \$151.72\frac{1}{2}
 \end{array}$$

$$\begin{array}{rcl}
 & (16) & \\
 £87 & \times 4 = & \$348.00 \\
 13 \text{ s.} & \times 20 = & 2.60 \\
 9 \text{ d.} = 36 \text{ q.} & \times 5 \div 12 = & .15 \\
 \hline
 & & \$350.75
 \end{array}$$

EX. XXX. (p. 66.)

(1)	(2)
\$217 ÷ 4 = £54 + \$1	\$327 ÷ 4 = £81 + \$3
125 cts. ÷ 20 = 6 s. + 5 cts.	355 cts. ÷ 20 = 17s. + 15c.
5 cts. × 3 ÷ 5 = 3d.	15 cts. × 3 ÷ 5 = 9d.
£54 6s. 3d.	£81 17s. 9d.
(3)	(4)
\$17 ÷ 4 = £4 + \$1	\$84 ÷ 4 = £21.
135 cts. ÷ 20 = 6s. + 15c.	50 cts. ÷ 20 = 2s. + 10 cts.
15 cts. × 3 ÷ 5 = 9d.	10 cts. × 3 ÷ 5 = 6d.
£4 6s. 9d.	£21 2s. 6d.

(5)

$$\begin{aligned} \$75 \div 4 &= £13 + \$3 \\ 395\text{c.} \div 20 &= 19\text{s.} + 15\text{c.} \\ 15\text{c.} \times 3 \div 5 &= 9\text{d.} \\ &£13 \ 19\text{s.} \ 9\text{d.} \end{aligned}$$

(6)

$$\begin{aligned} \$125 \div 4 &= £31 + \$1 \\ 137\frac{1}{2}\text{c.} \div 20 &= 6\text{s.} + 17\frac{1}{2}\text{c.} \\ 17\frac{1}{2}\text{c.} \times 3 \div 5 &= 10\frac{1}{2}\text{d.} \\ &£31 \ 6\text{s.} \ 10\frac{1}{2}\text{d.} \end{aligned}$$

(7)

$$\begin{aligned} \$867 \div 4 &= £216 + \$3 \\ 387\frac{1}{2}\text{c.} \div 20 &= 19\text{s.} + 7\frac{1}{2}\text{c.} \\ 7\frac{1}{2}\text{c.} \times 3 \div 5 &= 4\frac{1}{2}\text{d.} \\ &£216 \ 19\text{s.} \ 4\frac{1}{2}\text{d.} \end{aligned}$$

(8)

$$\begin{aligned} \$1162 \div 4 &= £290 + \$2 \\ 240\text{c.} \div 20 &= 12\text{s.} \\ &£290 \ 12\text{s.} \end{aligned}$$

(9)

$$\begin{aligned} \$1393 \div 4 &= £348 + \$1 \\ 162\frac{1}{2}\text{c.} \div 20 &= 8\text{s.} + 2\frac{1}{2}\text{c.} \\ 2\frac{1}{2}\text{c.} \times 3 \div 5 &= 1\frac{1}{2}\text{d.} \\ &£348 \ 8\text{s.} \ 1\frac{1}{2}\text{d.} \end{aligned}$$

(10)

$$\begin{aligned} \$1937 \div 4 &= £484 + \$1 \\ 120\text{c.} \div 20 &= 6\text{s.} \\ &£484 \ 6\text{s.} \end{aligned}$$

(11)

$$\begin{aligned} \$2220 \div 4 &= £555 \\ 29\text{c.} \div 20 &= 1\text{s.} + 9\text{c.} \\ 9\text{c.} \times 3 \div 5 &= 5\frac{3}{5}\text{d.} \\ &£555 \ 1\text{s.} \ 5\frac{3}{5}\text{d.} \end{aligned}$$

(12)

$$\begin{aligned} \$3785 \div 4 &= £946 + \$1 \\ 148\text{c.} \div 20 &= 7\text{s.} + 8\text{c.} \\ 8\text{c.} \times 3 \div 5 &= 5\frac{1}{5}\text{d.} \\ &£946 \ 7\text{s.} \ 5\frac{1}{5}\text{d.} \end{aligned}$$

Ex. XXXI. (p. 66.)

PAPER I.

(1)

$$\begin{array}{r} 35700 \\ 24191 \\ 18777 \\ 18129 \\ 21187 \\ \hline 117984 \end{array}$$

(2)

$$\begin{array}{r} 55146 \\ 23503 \\ 9889 \\ 6275 \\ 8369 \\ 4584 \\ \hline 107766 \end{array}$$

(3)

$$\begin{array}{r} 100000 \\ 229713 \\ 58705 \\ 612517 \\ 999999 \\ 833719 \\ 768309 \\ \hline 50050 \\ \hline 3659012 \end{array}$$

(4)
 5005
 7018
 17915
 28719
 9012
 807512
 717017
 93502
 212607

 1898307

(5)
 12) 178006

 3) 14833—10 in.

 $5\frac{1}{2} \left\{ \begin{array}{l} 4944-1 \text{ ft.} \\ 2 \\ 11) 9888 \end{array} \right.$

 49) 898—10 hf. yds. = 5 yds.

 8) 22—18 per.

 2—6 fur.

Ans.—2 mls., 6 fur., 18 per., 5 yds., 1 ft., 10 in.

(6)
 $\$ 8375180.20 \div 1493332 = \$ 5.60$ and a fraction.
 $\$ 43054836.00 \div 2506755 = \$ 17.17$ “ “
 $\$ 17.17 - \$ 5.60 = \$ 11.57$

PAPER II.

(1)
 8s. $10\frac{1}{2}$ d. \times 818
 10

 £4 8s. 9d.
 10

 £44 7s. 6d.
 8

 £355 0s. 0d.
 4 8s. 9d.
 3 11s. 0d.

 £362 19s. 9d.

(2)
 $67 \times \$1.62 = \108.54
 $82c. \times 13\frac{1}{2} = \$ 11.07$
 $\$11.07 + \$18 + \$16 = \$ 45.07 =$
 Total amount expended,
 $\$108.54 - \$45.07 = \$63.47$

$$\begin{array}{r}
 \text{ac.} \quad \text{ac.} \quad \text{r.} \quad \text{per.} \quad \text{yds.} \quad \text{ft.} \\
 397) 72812 (183 \quad 1 \quad 24 \quad 26 \quad 7\frac{1}{3}\frac{5}{9} \\
 \underline{397}
 \end{array}$$

$$\begin{array}{r}
 3311 \\
 3176 \\
 \hline
 \end{array}$$

$$\begin{array}{l}
 (4) \\
 160 \times \$1.60 = \$256.00 \\
 \$256 \div 27 = \$9.48\frac{4}{9}
 \end{array}$$

$$\begin{array}{r}
 1352 \\
 1191 \\
 \hline
 \end{array}$$

$$\begin{array}{l}
 (5) \\
 42\frac{1}{2} \text{ yds.} \div 8\frac{1}{2} = 5 \\
 8\frac{1}{2} \times 6\text{s. } 6\frac{1}{2}\text{d.} = £2 \text{ } 15\text{s. } 7\frac{1}{2}\text{d.}
 \end{array}$$

$$\begin{array}{r}
 161 \\
 4 \\
 \hline
 \end{array}$$

$$644 (1 \text{ ro.}$$

$$397$$

$$247$$

$$40$$

$$9880 (24 \text{ p.}$$

$$794$$

$$1940$$

$$1588$$

$$352$$

$$30\frac{1}{2}$$

$$10648 (26 \text{ yds.}$$

$$794$$

$$2708$$

$$2382$$

$$326$$

$$9$$

$$2934 (7\frac{1}{3}\frac{5}{9} \text{ ft.}$$

$$2779$$

$$155$$

$$\begin{array}{l}
 (6) \\
 \text{Amt. rec'd} = £1 \text{ } 13\text{s. } 9\text{d.} \times 618 \\
 = £1042 \text{ } 17\text{s. } 6\text{d.} = \$4171.50
 \end{array}$$

$$84 \times 17\text{c.} = \$14.28$$

$$3\text{s. } 9\text{d.} \times 5 = 18\text{s. } 9\text{d.} = 3.75$$

$$£1 \text{ } 15\text{s.} \times 2 = £3 \text{ } 10\text{s.} = 14.00$$

$$£2 \text{ } 11\text{s. } 9\text{d.} \times 8 = £20 \text{ } 14\text{s.} = 82.80$$

$$£12 \text{ } 19\text{s. } 9\text{d.} \times 15 = £194 \text{ } 18\text{s. } 9\text{d.} = 779.25$$

$$\therefore \text{Total amount expended} = \$944.08$$

$$\therefore \text{Deposit in bank} = \$4171.50 - \$944.08 =$$

$$\$3227.42.$$

PAPER III.

(1)

£ s. d.
203761) 9520732 14 6 (£46

815044

1370292

1222566

147726

20

2954534 (14s.

203761

916924

815044

101880

12

1222566 (6d.

1222566

(2)

Suppose 1 to represent the 1st
man's share,

$\therefore 1 + 3 + 5 = 9 = \text{No. of shares.}$

$\$63000 \div 9 = \$7000 = \text{value of}$
a share.

$\$7000 \times 1 = \7000

$\$7000 \times 3 = \21000

$\$7000 \times 5 = \35000

(3)

£ s. d.
26) 354 11 6 (£13

26

94

78

16

20

331 (12s.

312

19

12

234 (9d.

234

(4)			
ac.	ro.	per.	yds.
29) 10	2	7	2 (1 ro. 18 per. 5 yds. 2 ft.
4			
—			
42			(5)
29		tons.	cwt. qrs.
—		347) 300	15 3 (17 cwt.
13		20	
40		6015	
—		347	
527 (18 per.		—	
29		2545	
—		2429	
237		—	
232		116	
—		4	
5		—	
30½		467 (1 qr.	
—		347	
152		—	
1½		120	
—		25	
153½ (5 yds.		—	
145		600	
—		240	
8½		—	
9		3000 (8 lbs.	
—		2776	
74½ (2 ft.		—	
58		224	
—		16	
16½		—	
		1344	
		224	
		—	
		3584 (10 oz.	
		347	
		—	
		114	
		16	
		—	
		684	
		114	
		—	
		1824 (5 drs.	
		1735	
		—	
		89	

PAPER IV.

(1)	(2)	(4)
£3 17s. 6d. = \$27.50	$8+3=11$	$4 \times 38 = 152$ doz.
£3 12s. 9d. = \$14.55	$8+11-1=18$	Owner net, 1 sh.
\therefore sum = \$27.50 +		Owner boat, 2 shs.
\$30.27 + \$14.55 + \$75.83	(3)	Each man, 4 shs.
= \$148.15.	$54 \div 6 = 9$	Four men, 16 shs.
	$9 \times 1 = 9$	\therefore total no. of shs.
(6)	$9 \times 2 = 18$	$= 1+2+16 = 19$
$84889 - 889 = 84000$	$9 \times 3 = 27$	$152 \div 19 = 8$ doz. =
$84000 \div 2 = 42000$		value of 1 share.
$42000 + 889 = 42889$		$8 \times 1 = 8$ doz.
		$8 \times 2 = 16$ "
		$8 \times 4 = 32$ "

PAPER V.

(1)	(2)
72678397	$73697 \times 11689 = 861444233$
86073	$861444233 + 3687 = 861447920$
<hr/>	
218035191	(3)
508748779	$27812 - 15908 = 11904$
436070382	
581427176	(5)
<hr/>	(6)
6255647664981	22983
	96801
	64183
	91308
(4)	190060
$89264 \div 7 = 12752$	<hr/>
	465335
	<hr/>
	10240
	704
	8084
	4312
	72247
	<hr/>
	95587

PAPER VI.

(1)	(2)
$160302 + 168795 = 329097$	\$6000000
$71973 + 24527 = 96500$	4866666
160302	1467750
329097	800000
71973	1909640
96500	590382
<hr/>	862032
657872	<hr/>
	\$16496471

(3)		(4)	
\$7328146.68		\$375, team,	
1888576.76		\$ 82, wagon,	
621936.42		\$ 16, plough,	
417474.00		\$ 16, stove,	
66554.00		\$153, reaping machine,	
122142.77		\$ 96, sheep,	
		\$ 50, cows,	
		\$ 18, pigs,	
		\$ 60, wages.	
<u>\$10444830.63</u>		Total expenditure = \$866,	
(5)		\$975 - \$866 = \$109	
ac.		\$109 ÷ \$1.75 = 62.284	
635) 86895 (136 ac.		no. of hundred lbs.	
635		62.284 × 100 = 62284 lbs.	
<u>2339</u>			
1905			
			(6)
4345		mls.	per. yds.
3810		10	3 4
		8	
535		80	
4		40	
2140 (3 ro.		3203	
1905		5½	
235		16019	
40		1601½	
9400 (14 per.		17620½	
635		3	
3050	15427½ (24, 37½ yds.	52861½	
2540	1270	12	
510	2727½	634338	
30½	2540		
15300	187½	375	
127½			
	635	1270	

Ex. XXXII. (p. 71.)

$$\begin{array}{r} (1) \\ 8) 18(2 \\ \underline{16} \end{array}$$

$$\begin{array}{r} 2) 8(4 \\ \underline{8} \end{array}$$

∴ G. C. M. is 2

$$\begin{array}{r} (2) \\ 6) 15(2 \\ \underline{12} \end{array}$$

$$\begin{array}{r} 3) 6(2 \\ \underline{6} \end{array}$$

∴ G. C. M. is 3

$$\begin{array}{r} (3) \\ 4) 22(5 \\ \underline{20} \end{array}$$

$$\begin{array}{r} 2) 4(2 \\ \underline{4} \end{array}$$

∴ G. C. M. is 2

$$\begin{array}{r} (4) \\ 16) 28(1 \\ \underline{16} \end{array}$$

$$\begin{array}{r} 12) 16(1 \\ \underline{12} \end{array}$$

$$\begin{array}{r} 4) 12(3 \\ \underline{12} \end{array}$$

$$\begin{array}{r} (5) \\ 20) 32(1 \\ \underline{20} \end{array}$$

$$\begin{array}{r} 12) 20(1 \\ \underline{12} \end{array}$$

$$\begin{array}{r} 8) 12(1 \\ \underline{8} \end{array}$$

$$\begin{array}{r} 4) 8(2 \\ \underline{8} \end{array}$$

∴ G. C. M. is 4

$$\begin{array}{r} (6) \\ 24) 39(1 \\ \underline{24} \end{array}$$

$$\begin{array}{r} 15) 24(1 \\ \underline{15} \end{array}$$

$$\begin{array}{r} 9) 24(2 \\ \underline{18} \end{array}$$

$$\begin{array}{r} 6) 9(1 \\ \underline{6} \end{array}$$

$$\begin{array}{r} 3) 6(2 \\ \underline{6} \end{array}$$

∴ G. C. M. is 3

$$\begin{array}{r} (7) \\ 26) 44(1 \\ \underline{26} \end{array}$$

$$\begin{array}{r} 18) 26(1 \\ \underline{18} \end{array}$$

$$\begin{array}{r} 8) 18(2 \\ \underline{16} \end{array}$$

$$\begin{array}{r} 2) 8(4 \\ \underline{8} \end{array}$$

∴ G. C. M. is 2

$$\begin{array}{r} (8) \\ 30) 42(1 \\ \underline{30} \end{array}$$

$$\begin{array}{r} 12) 30(2 \\ \underline{24} \end{array}$$

$$\begin{array}{r} 6) 12(2 \\ \underline{12} \end{array}$$

∴ G. C. M. is 6

$$\begin{array}{r} (9) \\ 36) 56(1 \\ \underline{36} \end{array}$$

$$\begin{array}{r} 20) 36(1 \\ \underline{20} \end{array}$$

$$\begin{array}{r} 16) 20(1 \\ \underline{16} \end{array}$$

∴ G. C. M. is 4

$$\begin{array}{r} (10) \\ 46) 116(2 \\ \underline{92} \end{array}$$

$$\begin{array}{r} 24) 46(1 \\ \underline{24} \end{array}$$

$$\begin{array}{r} 22) 24(1 \\ \underline{22} \end{array}$$

∴ G. C. M. is 2

$$\begin{array}{r} (11) \\ 58) 174(3 \\ \underline{174} \end{array}$$

$$\begin{array}{r} 4) 16(4 \\ \underline{16} \end{array}$$

$$\begin{array}{r} 2) 22(11 \\ \underline{22} \end{array}$$

∴ G. C. M. is 3

$$\begin{array}{r} (12) \\ 315 \overline{) 378} \quad (1) \\ 315 \\ \hline \end{array}$$

$$\begin{array}{r} 63 \overline{) 315} \quad (5) \\ 315 \\ \hline \end{array}$$

\therefore G. C. M. is 63

$$\begin{array}{r} (15) \\ 310 \overline{) 630} \quad (2) \\ 620 \\ \hline \end{array}$$

$$\begin{array}{r} 10 \overline{) 310} \quad (31) \\ 310 \\ \hline \end{array}$$

\therefore G. C. M. is 10

$$\begin{array}{r} (17) \\ 127 \overline{) 445} \quad (4) \\ 381 \\ \hline \end{array}$$

$$\begin{array}{r} 64 \overline{) 127} \quad (1) \\ 64 \\ \hline \end{array}$$

$$\begin{array}{r} 63 \overline{) 64} \quad (1) \\ 63 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \overline{) 63} \quad (63) \\ 63 \\ \hline \end{array}$$

\therefore No G. C. M.

$$\begin{array}{r} (18) \\ 6408 \overline{) 7264} \quad (1) \\ 6408 \\ \hline \end{array}$$

$$\begin{array}{r} 856 \overline{) 6408} \quad (7) \\ 5992 \\ \hline \end{array}$$

$$\begin{array}{r} 416 \overline{) 856} \quad (2) \\ 832 \\ \hline \end{array}$$

(Continued on next page.)

$$\begin{array}{r} (13) \\ 128 \overline{) 366} \quad (2) \\ 256 \\ \hline \end{array}$$

$$\begin{array}{r} 110 \overline{) 128} \quad (1) \\ 110 \\ \hline \end{array}$$

$$\begin{array}{r} 18 \overline{) 110} \quad (6) \\ 108 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \overline{) 18} \quad (9) \\ 18 \\ \hline \end{array}$$

\therefore G. C. M. is 2

$$\begin{array}{r} (16) \\ 424 \overline{) 1216} \quad (2) \\ 848 \\ \hline \end{array}$$

$$\begin{array}{r} 368 \overline{) 424} \quad (1) \\ 368 \\ \hline \end{array}$$

$$\begin{array}{r} 56 \overline{) 368} \quad (6) \\ 336 \\ \hline \end{array}$$

$$\begin{array}{r} 32 \overline{) 56} \quad (1) \\ 32 \\ \hline \end{array}$$

$$\begin{array}{r} 24 \overline{) 32} \quad (1) \\ 24 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \overline{) 24} \quad (3) \\ 24 \\ \hline \end{array}$$

\therefore G. C. M. is 8

$$\begin{array}{r} (19) \\ 3042 \overline{) 3094} \quad (1) \\ 3042 \\ \hline \end{array}$$

$$\begin{array}{r} 52 \overline{) 3042} \quad (58) \\ 260 \\ \hline \end{array}$$

(18 and 19 continued.)

$$\begin{array}{r}
 \overline{24) 416 (17} \qquad \overline{442} \\
 \underline{24} \qquad \underline{416} \\
 176 \qquad 26) 52 (2 \\
 \underline{168} \qquad \underline{52} \\
 8) 24 (3 \qquad \therefore G. C. M. \text{ is } 26 \\
 \underline{24}
 \end{array}$$

$$\begin{array}{r}
 \therefore G. C. M. \text{ is } 8 \qquad \overline{(21)} \\
 1441) 1572 (1 \\
 \underline{1441}
 \end{array}$$

$$\begin{array}{r}
 \overline{(20)} \\
 7040) 7392 (1 \qquad \overline{131) 1441 (11} \\
 \underline{7040} \qquad \underline{131} \\
 352) 7040 (20 \qquad \underline{131} \\
 \underline{7040} \qquad \underline{131}
 \end{array}$$

$$\therefore G. C. M. \text{ is } 352 \qquad \therefore G. C. M. \text{ is } 131$$

$$\begin{array}{r}
 \overline{(22)} \qquad \overline{(23)} \\
 23025) 46436 (2 \qquad 21163) 204624 (9 \\
 \underline{46050} \qquad \underline{190512}
 \end{array}$$

$$\begin{array}{r}
 386) 23025 (59 \qquad 14112) 21168 (1 \\
 \underline{1930} \qquad \underline{14112}
 \end{array}$$

$$\begin{array}{r}
 3725 \qquad 7056) 14112 (2 \\
 \underline{3471} \qquad \underline{14112}
 \end{array}$$

$$\begin{array}{r}
 251) 386 (1 \qquad \therefore G. C. M. \text{ is } 7056 \\
 \underline{251}
 \end{array}$$

$$\begin{array}{r}
 \overline{135) 251 (1} \\
 \underline{135}
 \end{array}$$

$$\begin{array}{r}
 2) 13 (6 \\
 \underline{18}
 \end{array}$$

$$\begin{array}{r}
 116) 135 (1 \\
 \underline{116}
 \end{array}$$

$$\begin{array}{r}
 1) 2 (2 \\
 \underline{2}
 \end{array}$$

$$\begin{array}{r}
 19) 116 (6 \\
 \underline{114}
 \end{array}$$

$$\therefore \text{No G. C. M.}$$

$$\begin{array}{r} (24) \\ 29579) 97482 \text{ (3)} \\ \underline{88737} \end{array}$$

$$\begin{array}{r} 8745) 29579 \text{ (3)} \\ \underline{26235} \end{array}$$

$$\begin{array}{r} 3344) 8745 \text{ (2)} \\ \underline{6688} \end{array}$$

$$\begin{array}{r} 2057) 3344 \text{ (1)} \\ \underline{2057} \end{array}$$

$$\begin{array}{r} 1287) 2057 \text{ (1)} \\ \underline{1287} \end{array}$$

$$\begin{array}{r} 770) 1287 \text{ (1)} \\ \underline{770} \end{array}$$

$$\begin{array}{r} (25) \\ 738140) 828597 \text{ (1)} \\ \underline{738140} \end{array}$$

$$\begin{array}{r} 517) 770 \text{ (1)} \\ \underline{517} \end{array}$$

$$\begin{array}{r} 90457) 738140 \text{ (8)} \\ \underline{723656} \end{array}$$

$$\begin{array}{r} 253) 517 \text{ (2)} \\ \underline{506} \end{array}$$

$$\begin{array}{r} 14484) 90457 \text{ (6)} \\ \underline{86904} \end{array}$$

$$\begin{array}{r} 11) 253 \text{ (23)} \\ \underline{253} \end{array}$$

$$3553) 14484 \text{ (4)}$$

$$\begin{array}{r} 14212 \\ \hline \end{array} \therefore \text{G. C. M. is 11}$$

$$\begin{array}{r} 272) 3553 \text{ (13)} \\ \underline{272} \end{array}$$

$$\begin{array}{r} 833 \\ \underline{816} \end{array}$$

$$\begin{array}{r} 17) 272 \text{ (16)} \\ \underline{17} \end{array}$$

$$\begin{array}{r} 102 \\ \underline{102} \end{array}$$

$$\therefore \text{G. C. M. is 17}$$

(26)

$$\begin{array}{r} 326337) 737800 (2 \\ 652674 \\ \hline \end{array}$$

$$\begin{array}{r} 85126) 326337 (3 \\ 255378 \\ \hline \end{array}$$

$$\begin{array}{r} 70959) 85126 (1 \\ 70959 \\ \hline \end{array}$$

$$\begin{array}{r} 14167) 70959 (5 \\ 70835 \\ \hline \end{array}$$

$$\begin{array}{r} 124) 14167 (114 \\ 124 \\ \hline \end{array}$$

$$\begin{array}{r} 176 \\ 124 \\ \hline \end{array}$$

$$\begin{array}{r} 527 \\ 496 \\ \hline \end{array}$$

$$\begin{array}{r} 31) 124 (4 \\ 124 \\ \hline \end{array}$$

\therefore G. C. M. is 31

Ex. XXXIII. (p. 72.)

$$\begin{array}{r} (1) \\ 2 \overline{) 2, 4, 10} \end{array}$$

$$\therefore \text{L. C. M.} = 2 \times 2 \times 5 = 20$$

$$\begin{array}{r} (3) \\ 2 \overline{) 12, 16, 18} \\ 2 \overline{) 6, 8, 9} \\ 3 \overline{) 3, 4, 9} \end{array}$$

$$\begin{array}{r} 1, 4, 3 \\ \therefore \text{L. C. M.} = 2 \times 2 \times 5 \times 7 \times 9 = 1260 \\ \therefore \text{L. C. M.} = 2 \times 2 \times 3 \times 4 \times 3 = 144 \end{array}$$

$$\begin{array}{r} (2) \\ 4 \overline{) 8, 9, 12} \\ 3 \overline{) 2, 9, 3} \end{array}$$

$$\therefore \text{L. C. M.} = 4 \times 3 \times 2 \times 3 = 72$$

$$\begin{array}{r} (4) \\ 2 \overline{) 20, 28, 36} \\ 2 \overline{) 10, 14, 18} \end{array}$$

$$\begin{array}{r} 5, 7, 9 \end{array}$$

2	16, ⁽⁵⁾ 24, 30
2	8, 12, 15
2	4, 6, 15
3	2, 3, 15

$$\therefore \text{L. C. M.} = 2 \times 2 \times 2 \times 3 \times 2 \times 5 = 240$$

$$\text{L. C. M.} = 2 \times 2 \times 2 \times 3 \times 7 = 168$$

5	13, ⁽⁷⁾ 25, 105
---	----------------------------

$$\therefore \text{L. C. M.} = 5 \times 5 \times 21 = 525$$

2	7, ⁽⁹⁾ 21, 6, 14, 25
3	21, 3, 7, 25

$$\therefore \text{L. C. M.} = 2 \times 3 \times 7 \times 25 = 1050$$

2	7, 8, 9, 10, 12
2	7, 4, 9, 5, 6
3	7, 2, 9, 5, 3

$$\therefore \text{L. C. M.} = 2 \times 2 \times 7 \times 2 \times 3 \times 5 \times 3 = 2520$$

$$\therefore \text{L. C. M.} = 2 \times 2 \times 2 \times 3 \times 7 \times 3 \times 11 \times 2 = 11088$$

5	2, ⁽¹²⁾ 5, 45, 15, 25
---	----------------------------------

$$\therefore \text{L. M.} = 5 \times 2 \times 9 \times 5 = 450$$

$$\therefore \text{L. C. M.} = 3 \times 8 \times 5 \times 9 = 1080$$

2	⁽⁶⁾ 24, 56, 84
2	12, 28, 42
2	6, 14, 21
3	3, 7, 21

2	⁽⁸⁾ 6, 33, 24, 32
2	33, 12, 16
2	33, 6, 8
3	33, 3, 4

$$\therefore \text{L. C. M.} = 2 \times 2 \times 2 \times 3 \times 11 \times 4 = 1056$$

2	⁽¹¹⁾ 24, 28, 36, 22, 16
2	12, 14, 18, 11, 8
2	6, 7, 9, 11, 4
3	3, 7, 9, 11, 2

$$\therefore \text{L. C. M.} = 7 \times 3 \times 11 \times 2$$

3	⁽¹³⁾ 9, 4, 8, 15, 27
---	---------------------------------

$$8, 5, 9$$

$$\begin{array}{l|l}
 \begin{array}{l}
 (14) \\
 2 \mid 15, 20, 24, 21, 35 \quad 2 \\
 \hline
 2 \mid 15, 10, 12, 21, 35 \quad 3 \\
 \hline
 3 \mid 15, 5, 6, 21, 35 \\
 \hline
 5, 5, 2, 7, 35
 \end{array}
 &
 \begin{array}{l}
 (15) \\
 4, 5, 7, 8, 15, 21, 30 \\
 \hline
 4, 21, 15 \\
 \hline
 4, 7, 5 \\
 \hline
 \therefore \text{L. C. M.} = 2 \times 3 \times 4 \times 7 \times 5 = 840
 \end{array}
 \end{array}$$

$$\therefore \text{L. C. M.} = 2 \times 2 \times 3 \times 2 \times 35 = 840$$

$$\begin{array}{l|l}
 \begin{array}{l}
 (16) \\
 3 \mid 2, 7, 9, 15, 52, 63 \quad 3 \\
 \hline
 5, 52, 21 \quad 11 \\
 \hline
 \therefore \text{L. C. M.} = 3 \times 5 \times 52 \times 21 = 16380
 \end{array}
 &
 \begin{array}{l}
 (17) \\
 3, 7, 21, 11, 77, 198 \\
 \hline
 7, 77, 66 \\
 \hline
 7, 6 \\
 \hline
 \therefore \text{L. C. M.} = 3 \times 11 \times 7 \times 6 = 1386
 \end{array}
 \end{array}$$

$$\begin{array}{l|l}
 \begin{array}{l}
 (18) \\
 2 \mid 100, 56, 35, 125, 150 \quad 5 \\
 \hline
 2 \mid 50, 28, 125, 75 \\
 \hline
 5 \mid 25, 14, 125, 75 \\
 \hline
 5 \mid 14, 25, 15 \\
 \hline
 14, 5, 3 \\
 \hline
 \therefore \text{L. C. M.} = 2 \times 2 \times 5 \times 5 \times 14 \times 5 \times 3 = 21000
 \end{array}
 &
 \begin{array}{l}
 (19) \\
 22, 55, 19, 15, 95, 133 \\
 \hline
 22, 11, 3, 19, 133 \\
 \hline
 \therefore \text{L. C. M.} = 5 \times 22 \times 3 \times 133 = 43890
 \end{array}
 \end{array}$$

$$\begin{array}{l|l}
 \begin{array}{l}
 (20) \\
 2 \mid 48, 64, 27, 33, 110, 165 \\
 \hline
 2 \mid 24, 32, 27, 55, 165 \\
 \hline
 2 \mid 12, 16, 27, 165 \\
 \hline
 2 \mid 6, 8, 27, 165 \\
 \hline
 3 \mid 3, 4, 27, 165 \\
 \hline
 4, 9, 55 \\
 \hline
 \therefore \text{L. C. M.} = 2 \times 2 \times 2 \times 2 \times 3 \times 4 \times 9 \times 55 = 95040
 \end{array}
 &
 \end{array}$$

EX. XXXVII. (p. 76.)

- (1) $\frac{5}{2} = 3$. (2) $\frac{5}{2} = 2\frac{1}{2}$. (3) $\frac{13}{3} = 4\frac{1}{3}$. (4) $\frac{16}{4} = 4$.
 (5) $\frac{19}{6} = 3\frac{1}{6}$ (6) $\frac{47}{9} = 5\frac{2}{9}$ (7) $\frac{59}{9} = 6\frac{5}{9}$ (8) $\frac{76}{11} = 6\frac{10}{11}$
 (9) $\frac{91}{13} = 7$ (10) $\frac{112}{14} = 8$ (11) $\frac{231}{27} = 8\frac{5}{9}$ (12) $\frac{804}{43} = 18\frac{2}{43}$
 (13) $\frac{1000}{107} = 9\frac{27}{107}$ (14) $\frac{26540}{260} = 102\frac{20}{260}$ (15) $\frac{1718}{133} = 12\frac{2}{133}$

EX. XXXVIII. (p. 76.)

- (1) $1\frac{1}{3} = \frac{1 \times 3 + 1}{3} = \frac{4}{3}$ (2) $2\frac{1}{2} = \frac{2 \times 2 + 1}{2} = \frac{5}{2}$
 (3) $1\frac{1}{5} = \frac{1 \times 5 + 1}{5} = \frac{6}{5}$ (4) $17\frac{3}{5} = \frac{17 \times 5 + 3}{5} = \frac{88}{5}$
 (5) $12\frac{5}{7} = \frac{12 \times 7 + 5}{7} = \frac{89}{7}$ (6) $203\frac{17}{19} = \frac{203 \times 19 + 17}{19} = \frac{3874}{19}$
 (7) $2\frac{11}{65} = \frac{2 \times 65 + 11}{65} = \frac{141}{65}$ (8) $29\frac{7}{8} = \frac{29 \times 8 + 7}{8} = \frac{239}{8}$
 (9) $704\frac{12}{126} = \frac{704 \times 126 + 12}{126} = \frac{88716}{126}$
 (10) $900\frac{31}{401} = \frac{900 \times 401 + 31}{401} = \frac{360931}{401}$
 (11) $5\frac{7}{680} = \frac{5 \times 680 + 7}{680} = \frac{3407}{680}$
 (12) $53\frac{37}{63} = \frac{53 \times 63 + 37}{63} = \frac{3376}{63}$
 (13) $21\frac{3}{1250} = \frac{21 \times 1250 + 3}{1250} = \frac{26253}{1250}$
 (14) $148\frac{37}{465} = \frac{148 \times 465 + 37}{465} = \frac{69057}{465}$
 (15) $13\frac{0}{2160} = \frac{13 \times 2160 + 0}{2160} = \frac{28080}{2160}$
 (16) $25\frac{389}{2400} = \frac{25 \times 2400 + 389}{2400} = \frac{60389}{2400}$
 (17) $197\frac{395}{5081} = \frac{197 \times 5081 + 395}{5081} = \frac{1001192}{5081}$

EX. XXXIX. (p. 77.)

$$(1) \frac{4}{5} \text{ of } \frac{3}{5} = \frac{3 \times 4}{4 \times 5} = \frac{3}{5} \quad (2) \frac{4}{5} \text{ of } 1\frac{2}{3} = \frac{4 \times 10}{5 \times 12} = \frac{2}{3}$$

$$(3) \frac{3}{7} \text{ of } 2\frac{1}{9} = \frac{9}{19} \quad (4) 1\frac{3}{10} \text{ of } 1\frac{8}{11} = \frac{12}{55}$$

$$(5) \frac{5}{6} \text{ of } 2\frac{5}{8} = \frac{5}{6} \times \frac{21}{8} = \frac{35}{16} \quad (6) \frac{2}{3} \text{ of } 1\frac{1}{4} = \frac{2}{3} \times \frac{5}{4} = \frac{5}{6}$$

$$(7) 18\frac{2}{3} \text{ of } 5\frac{7}{16} \text{ of } 10 = \frac{164}{9} \times \frac{87}{16} \times \frac{10}{1} = \frac{5945}{6}$$

$$(8) 11\frac{2}{3} \text{ of } 8\frac{3}{7} = \frac{57}{5} \times \frac{59}{7} = \frac{3363}{35}$$

$$(9) \frac{5}{6} \text{ of } 2\frac{1}{3} \text{ of } 9 = \frac{5}{6} \times \frac{7}{3} \times \frac{9}{1} = \frac{35}{2}$$

$$(10) \frac{4}{7} \text{ of } 3\frac{1}{4} \text{ of } 3\frac{1}{2} = \frac{4}{7} \times \frac{15}{4} \times \frac{7}{2} = \frac{15}{2}$$

$$(11) \frac{5}{8} \text{ of } 1\frac{3}{11} \text{ of } 2\frac{2}{9} \text{ of } 4\frac{1}{3} = \frac{1}{36}$$

$$(12) 1\frac{3}{14} \text{ of } 4\frac{5}{9} \text{ of } \frac{6}{37} \text{ of } 6\frac{8}{11} \text{ of } \frac{7}{82} = \frac{3}{14} \times \frac{41}{9} \times \frac{6}{37} \times \frac{74}{11} \times \frac{7}{82}$$

$$= \frac{1}{11} \quad (13) 1\frac{5}{11} \text{ of } 2\frac{1}{2} \text{ of } \frac{5}{7} \text{ of } 10\frac{1}{2} = \frac{5}{11} \times \frac{5}{2} \times \frac{5}{7} \times \frac{21}{3} = \frac{375}{44}$$

$$(14) \frac{7}{8} \text{ of } 12\frac{1}{2} \text{ of } \frac{4}{5} \text{ of } \frac{5}{6} \text{ of } \frac{8}{9} \text{ of } 9 = \frac{7}{9} \times \frac{25}{2} \times \frac{4}{5} \times \frac{5}{6} \times \frac{3}{8} \times \frac{9}{1}$$

$$= \frac{175}{8} \quad (15) 1\frac{5}{8} \text{ of } \frac{7}{3} \text{ of } 2\frac{6}{10} \text{ of } \frac{2}{4} \text{ of } 1\frac{3}{10} \text{ of } 2 \text{ of } 2\frac{8}{7} =$$

$$\frac{5}{18} \times \frac{7}{3} \times \frac{36}{10} \times \frac{9}{4} \times \frac{3}{10} \times \frac{2}{1} \times \frac{8}{27} = \frac{14}{15}$$

(16) $\frac{5}{7}$ of $\frac{3}{8}$ of $\frac{6}{7}$ of $70\frac{3}{5}$ of $\frac{3}{4}$ of $1\frac{1}{2}$ of $147 =$

$$\frac{5}{7} \times \frac{3}{8} \times \frac{6}{7} \times \frac{632}{9} \times \frac{3}{40} \times \frac{18}{11} \times \frac{147}{1} = \frac{6399}{22}.$$

Ex XL. (p. 78.)

In each of the following examples we divide numerator and denominator by their G. C. M., or as we shall write it:

$$(1) \frac{2}{4} = \frac{2 \div 2}{4 \div 2} = \frac{1}{2}.$$

$$(2) 1\frac{10}{15} = \frac{10 \div 5}{15 \div 5} = \frac{2}{3}.$$

$$(3) \frac{14}{21} = \frac{14 \div 7}{21 \div 7} = \frac{2}{3}.$$

$$(4) 3\frac{30}{48} = \frac{30 \div 6}{48 \div 6} = \frac{5}{8}.$$

$$(5) \frac{28}{63} = \frac{28 \div 7}{63 \div 7} = \frac{4}{9}.$$

$$(6) \frac{64}{84} = \frac{64 \div 4}{84 \div 4} = \frac{16}{21}.$$

$$(7) 1\frac{77}{121} = \frac{77 \div 11}{121 \div 11} = \frac{7}{11}.$$

$$(8) 2\frac{48}{272} = \frac{48 \div 16}{272 \div 16} = \frac{3}{17}.$$

$$(9) 1\frac{1428}{2652} = \frac{1428 \div 204}{2652 \div 204} = \frac{7}{13}.$$

$$(10) 1\frac{1408}{1664} = \frac{1408 \div 128}{1664 \div 128} = \frac{11}{13}.$$

$$(11) 1\frac{875}{1000} = \frac{875 \div 125}{1000 \div 125} = \frac{7}{8}.$$

$$(12) 1\frac{1690}{2600} = \frac{1690 \div 130}{2600 \div 130} = \frac{13}{20}.$$

$$(13) 2\frac{837}{2268} = \frac{837 \div 27}{2268 \div 27} = \frac{31}{84}.$$

$$(14) \frac{6006}{8008} = \frac{6006 \div 2002}{8008 \div 2002} = \frac{3}{4}.$$

$$(15) 2\frac{805}{2622} = \frac{805 \div 23}{2622 \div 23} = \frac{35}{114}.$$

$$(16) 1\frac{9504}{10692} = \frac{9504 \div 1188}{10692 \div 1188} = \frac{8}{9}.$$

$$(17) 3\frac{23111}{33759} = \frac{23111 \div 121}{33759 \div 121} = \frac{191}{279}.$$

$$(18) \frac{30599}{271469} = \frac{30599 \div 37}{271469 \div 37} = \frac{827}{7337}$$

$$(19) \frac{5170}{8734} = \frac{5170 \div 22}{8734 \div 22} = \frac{235}{397}$$

$$(20) \frac{1236}{1632} = \frac{1236 \div 12}{1632 \div 12} = \frac{103}{136}$$

$$(21) \frac{285714}{999999} = \frac{285714 \div 142857}{999999 \div 142857} = \frac{2}{7}$$

$$(22) \frac{10395}{16819} = \frac{10395 \div 11}{16819 \div 11} = \frac{945}{1529}$$

$$(23) \frac{7040}{7392} = \frac{7040 \div 352}{7392 \div 352} = \frac{20}{21}$$

$$(24) \frac{11385}{16335} = \frac{11385 \div 495}{16335 \div 495} = \frac{23}{33}$$

EX. XLI. (p. 79.)

(1) $\frac{1}{4}, \frac{5}{6}$. 12 is L. C. M. of denominators;

\therefore fractions become $\frac{3 \times 3}{4 \times 3}, \frac{5 \times 2}{6 \times 2}$ or $\frac{9}{12}, \frac{10}{12}$.

(2) $\frac{1}{4}, \frac{2}{3}$. 12 is L. C. M. of denominators;

\therefore fractions become $\frac{3 \times 3}{4 \times 3}, \frac{2 \times 4}{3 \times 4}$ or $\frac{9}{12}, \frac{8}{12}$.

(3) $\frac{1}{4}, \frac{7}{8}$. 8 is L. C. M. of denominators;

\therefore fractions become $\frac{3 \times 2}{4 \times 2}, \frac{7 \times 1}{8 \times 1}$ or $\frac{6}{8}, \frac{7}{8}$.

(4) $\frac{3}{7}, \frac{5}{9}$. 63 is L. C. M. of denominators;

\therefore fractions become $\frac{3 \times 9}{7 \times 9}, \frac{5 \times 7}{9 \times 7}$ or $\frac{27}{63}, \frac{35}{63}$.

(5) $\frac{11}{16}, \frac{21}{24}$. 48 is L. C. M. of denominators;

\therefore fractions become $\frac{11 \times 3}{16 \times 3}, \frac{21 \times 2}{24 \times 2}$ or $\frac{33}{48}, \frac{42}{48}$.

(6) $\frac{1}{2}, \frac{7}{40}$. 120 is L. C. M. of denominators;

\therefore fractions become $\frac{11 \times 10}{12 \times 10}, \frac{27 \times 3}{40 \times 3}$ or $\frac{110}{120}, \frac{81}{120}$

(7) $\frac{7}{10}, \frac{183}{200}$. 200 is L. C. M. of denominators;

\therefore fractions become $\frac{7 \times 20}{10 \times 20}, \frac{183 \times 1}{200 \times 1}$ or $\frac{140}{200}, \frac{183}{200}$

(8) $\frac{113}{280}, \frac{527}{960}$. 6720 is L. C. M. of denominators;

\therefore fractions become $\frac{113 \times 24}{280 \times 24}, \frac{527 \times 7}{960 \times 7}$ or $\frac{2712}{6720}, \frac{3689}{6720}$

(9) $\frac{4}{5}, \frac{11}{12}$. 60 is L. C. M. of denominators;

\therefore fractions become $\frac{4 \times 12}{5 \times 12}, \frac{11 \times 5}{12 \times 5}$ or $\frac{48}{60}, \frac{55}{60}$

(10) $\frac{3}{16}, \frac{8}{21}, \frac{5}{9}$. 1008 is L. C. M. of den^{rs}.; \therefore fractions

become $\frac{3 \times 63}{16 \times 63}, \frac{8 \times 48}{21 \times 48}, \frac{5 \times 112}{9 \times 112}$ or $\frac{189}{1008}, \frac{384}{1008}, \frac{560}{1008}$

(11) $\frac{7}{15}, \frac{11}{21}, \frac{23}{30}$. 210 is L. C. M. of den^{rs}.; \therefore fractions

become $\frac{7 \times 14}{15 \times 14}, \frac{11 \times 10}{21 \times 10}, \frac{23 \times 7}{30 \times 7}$ or $\frac{98}{210}, \frac{110}{210}, \frac{161}{210}$

(12) $\frac{7}{9}, \frac{8}{11}, \frac{13}{15}, \frac{9}{17}$. 8415 is L. C. M. of den^{rs}.; \therefore fract^{ns}.

become $\frac{7 \times 935}{9 \times 935}, \frac{8 \times 765}{11 \times 765}, \frac{13 \times 561}{15 \times 561}, \frac{9 \times 495}{17 \times 495}$ or $\frac{6545}{8415}$

$\frac{6120}{8415}, \frac{7293}{8415}, \frac{4455}{8415}$

(13) $\frac{13}{14}, \frac{35}{36}, \frac{14}{15}, \frac{40}{63}$. 1260 is L. C. M. of den^{rs}.; \therefore fract^{ns}.

become $\frac{13 \times 90}{14 \times 90}, \frac{35 \times 35}{36 \times 35}, \frac{14 \times 84}{15 \times 84}, \frac{40 \times 20}{63 \times 20}$ or $\frac{1170}{1260}$

$\frac{1225}{1260}, \frac{1176}{1260}, \frac{800}{1260}$

(14) $\frac{7}{12}, \frac{17}{30}, \frac{13}{18}, \frac{15}{20}, \frac{9}{16}$. 180 is L. C. M. of denominators;

\therefore fractions become $\frac{7 \times 15}{12 \times 15}, \frac{17 \times 6}{30 \times 6}, \frac{13 \times 10}{18 \times 10}, \frac{15 \times 9}{20 \times 9}$

$$\frac{7 \times 12}{15 \times 12} \text{ or } \frac{105}{180}, \frac{102}{180}, \frac{130}{180}, \frac{135}{180}, \frac{84}{180}.$$

(15) $\frac{1}{2}, \frac{2}{3}, \frac{7}{12}, \frac{1}{4}$. 7200 is L. C. M. of den^{rs.}; \therefore fract^{ns.}.

$$\begin{aligned} \text{become } & \frac{13 \times 288}{25 \times 288}, \frac{27 \times 225}{32 \times 225}, \frac{7 \times 600}{12 \times 600}, \frac{15 \times 400}{18 \times 400} \\ & \text{or } \frac{3744}{7200}, \frac{6075}{7200}, \frac{4200}{7200}, \frac{6000}{7200}. \end{aligned}$$

(16) $\frac{9}{14}, \frac{13}{18}, \frac{7}{29}, \frac{1}{35}, \frac{23}{42}, \frac{53}{68}$. 621180 is L. C. M. of den^{rs.};

$$\begin{aligned} \therefore \text{fractions become } & \frac{9 \times 44370}{14 \times 44370}, \frac{13 \times 34510}{18 \times 34510}, \frac{7 \times 21420}{29 \times 21420}, \\ & \frac{18 \times 17748}{35 \times 17748}, \frac{23 \times 14790}{42 \times 14790}, \frac{53 \times 9135}{68 \times 9135} \text{ or } \frac{399330}{621180}, \frac{448630}{621180}, \\ & \frac{149940}{621180}, \frac{319464}{621180}, \frac{340170}{621180}, \frac{484155}{621180}. \end{aligned}$$

(17) $\frac{2}{3}, \frac{4}{5}, \frac{3}{8}, \frac{1}{10}$. 120 is L. C. M. of den^{rs.}; \therefore fractions

$$\begin{aligned} \text{become } & \frac{2 \times 40}{3 \times 40}, \frac{4 \times 24}{5 \times 24}, \frac{3 \times 15}{8 \times 15}, \frac{14 \times 8}{15 \times 8} \text{ or } \frac{80}{120}, \frac{96}{120}, \\ & \frac{45}{120}, \frac{112}{120}. \end{aligned}$$

(18) $\frac{3}{4}, \frac{5}{6}, \frac{7}{8}, \frac{9}{10}$. 120 is L. C. M. of den^{rs.}; \therefore fractions

$$\begin{aligned} \text{become } & \frac{3 \times 30}{4 \times 30}, \frac{5 \times 20}{6 \times 20}, \frac{7 \times 15}{8 \times 15}, \frac{9 \times 12}{10 \times 12} \text{ or } \frac{90}{120}, \frac{100}{120}, \\ & \frac{105}{120}, \frac{108}{120}. \end{aligned}$$

(19) $\frac{2}{3}, \frac{5}{6}, \frac{7}{8}, \frac{5}{9}, \frac{8}{12}$. 72 is L. C. M. of den^{rs.}; \therefore fractions

$$\begin{aligned} \text{become } & \frac{2 \times 24}{3 \times 24}, \frac{5 \times 12}{6 \times 12}, \frac{7 \times 9}{8 \times 9}, \frac{5 \times 8}{9 \times 8}, \frac{8 \times 6}{12 \times 6}, \\ & \text{or } \frac{48}{72}, \frac{60}{72}, \frac{63}{72}, \frac{40}{72}, \frac{48}{72}. \end{aligned}$$

(20) $\frac{2}{3}, \frac{4}{5}, \frac{1}{11}, \frac{3}{11}$. 330 is L. C. M. of den^{rs}.; \therefore fractions

become $\frac{2 \times 110}{3 \times 100}, \frac{4 \times 66}{5 \times 66}, \frac{1 \times 165}{2 \times 165}, \frac{3 \times 30}{11 \times 30}$ or

$$\frac{220}{330}, \frac{264}{330}, \frac{165}{330}, \frac{90}{330}.$$

Ex. XLII. (p. 80.)

(1) $\frac{2}{3}, \frac{4}{5}$; 15 is L. C. M. of den^{rs}.; \therefore fractions become

$$\frac{2 \times 5}{3 \times 5}, \frac{4 \times 3}{5 \times 3} \text{ or } \frac{10}{15}, \frac{12}{15}$$

\therefore in order of magnitude the fractions stand thus, $\frac{4}{5}, \frac{2}{3}$.

(2) $\frac{7}{9}, \frac{9}{12}$; 36 is L. C. M. of den^{rs}.; \therefore fractions become

$$\frac{7 \times 4}{9 \times 4}, \frac{9 \times 3}{12 \times 3} \text{ or } \frac{28}{36}, \frac{27}{36}$$

\therefore in order of magnitude the fractions stand thus, $\frac{7}{9}, \frac{9}{12}$.

(3) $\frac{17}{24}, \frac{19}{26}$; 312 is L. C. M. of den^{rs}.; \therefore fract^{ns}. become

$$\frac{17 \times 13}{24 \times 13}, \frac{19 \times 12}{26 \times 12} \text{ or } \frac{221}{312}, \frac{228}{312}$$

\therefore in order of magnitude the fractions stand thus, $\frac{17}{24}, \frac{19}{26}$.

(4) $\frac{7}{9}, \frac{5}{8}, \frac{11}{14}$; 504 is L. C. M. of den^{rs}.; \therefore fract^{ns}. become

$$\frac{7 \times 56}{9 \times 56}, \frac{5 \times 63}{8 \times 63}, \frac{11 \times 36}{14 \times 36} \text{ or } \frac{392}{504}, \frac{315}{504}, \frac{396}{504}$$

\therefore in order of magnitude the fractions stand thus, $\frac{11}{14}, \frac{7}{9}, \frac{5}{8}$.

(5) $\frac{15}{42}, \frac{22}{49}, \frac{48}{63}$; 882 is L. C. M. of den^{rs}.; \therefore fract^{ns}. become

$$\frac{15 \times 21}{42 \times 21}, \frac{22 \times 18}{49 \times 18}, \frac{48 \times 14}{63 \times 14} \text{ or } \frac{315}{882}, \frac{396}{882}, \frac{672}{882}$$

\therefore in order of magnitude the fract^{ns}. stand thus, $\frac{48}{63}, \frac{22}{49}, \frac{15}{42}$.

(6) $\frac{53}{80}, \frac{63}{90}, \frac{57}{84}$; 5040 is L. C. M. of den^{rs}.; \therefore fract^{ns}. become

$$\frac{53 \times 63}{80 \times 63}, \frac{63 \times 56}{90 \times 56}, \frac{57 \times 60}{84 \times 60} \text{ or } \frac{3339}{5040}, \frac{3528}{5040}, \frac{3420}{5040}$$

\therefore in order of magnitude the fract^{ns}. stand thus, $\frac{53}{80}, \frac{57}{84}, \frac{63}{90}$.

(7) $\frac{2}{3}$ of $\frac{5}{9} = \frac{10}{27}$; $\frac{1}{2}$ of $\frac{3}{4} = \frac{3}{8}$; $7\frac{2}{3} = \frac{22}{3}$; 168 is L. C. M. of denominators; \therefore fractions become

$\frac{5 \times 8}{21 \times 8}$, $\frac{3 \times 12}{14 \times 12}$, $\frac{59 \times 21}{8 \times 21}$ or $\frac{40}{168}$, $\frac{36}{168}$, $\frac{1239}{168}$ \therefore in order of magnitude the fractions stand thus, $7\frac{2}{3}$, $\frac{2}{3}$ of $\frac{5}{9}$, $\frac{1}{2}$ of $\frac{3}{4}$.

(8) $\frac{1}{15}$, $\frac{1}{20}$, $\frac{2}{25}$, $\frac{3}{30}$; 300 is L. C. M. of den^{rs}; \therefore fract^{ns}.

become $\frac{11 \times 20}{15 \times 20}$, $\frac{17 \times 15}{20 \times 15}$, $\frac{21 \times 12}{25 \times 12}$, $\frac{29 \times 10}{30 \times 10}$ or $\frac{220}{300}$,
 $\frac{255}{300}$, $\frac{252}{300}$, $\frac{290}{300}$ \therefore in order of magnitude the fractions stand thus, $\frac{2}{30}$, $\frac{1}{20}$, $\frac{2}{25}$, $\frac{1}{15}$.

(9) $\frac{6}{11}$ of $\frac{1}{9}$ of $7\frac{1}{2} = \frac{2}{11}$; $4\frac{1}{2}$ of $\frac{2}{3} = \frac{3}{11}$; $\frac{1}{9}$ of $7\frac{1}{2}$ of 11 = $\frac{5}{6}$; $\frac{3}{5}$ of $4\frac{1}{5}$ of $14\frac{7}{11} = \frac{16}{9}$; 6336 is L. C. M. of denominators; \therefore fractions become
 $\frac{29 \times 576}{11 \times 576}$, $\frac{3 \times 576}{11 \times 576}$, $\frac{55 \times 99}{64 \times 99}$, $\frac{1610 \times 64}{99 \times 74}$ or $\frac{16704}{6336}$, $\frac{1728}{6336}$, $\frac{5445}{6336}$,
 $\frac{103040}{6336}$ \therefore in order of magnitude the fract^{ns}. stand thus,

$\frac{3}{5}$ of $4\frac{1}{5}$, of $\frac{1}{9}$ of $14\frac{7}{11}$, $\frac{6}{11}$ of $\frac{1}{9}$ of $7\frac{1}{2}$, $\frac{1}{9}$ of $7\frac{1}{2}$ of 11, $4\frac{1}{2}$ of $\frac{2}{3}$.

(10) $\frac{6}{5} \times \frac{4}{5}$ of $\frac{8}{7} = \frac{4}{5}$; $\frac{1}{7}$ of $6\frac{1}{5}$ of $\frac{1}{5}$ of $1\frac{1}{2} = \frac{1}{7}$; $1\frac{6}{7}$ of $1\frac{1}{5}$ of $5\frac{1}{9}$ of $\frac{1}{2}$ of $1\frac{2}{8} = \frac{2}{3}$; 63 is L. C. M. of denominators;

\therefore fractions become $\frac{4 \times 7}{9 \times 7}$, $\frac{11 \times 9}{7 \times 9}$, $\frac{20 \times 21}{3 \times 21}$ or $\frac{28}{63}$, $\frac{99}{63}$,

$\frac{420}{63}$ \therefore in order of magnitude the fractions $1\frac{6}{7}$ of $1\frac{1}{5}$ of

$5\frac{1}{9}$ of $\frac{1}{2}$ of $1\frac{2}{8}$, $\frac{1}{7}$ of $6\frac{1}{5}$ of $\frac{1}{5}$ of $1\frac{1}{2}$, $\frac{6}{5} \times \frac{4}{5}$ of $\frac{8}{7}$.

(11) $\frac{4}{7}$, $\frac{3}{5}$; 35 is L. C. M. of den^{rs}; \therefore fractions become

$$\frac{5 \times 5}{7 \times 5}, \frac{3 \times 7}{5 \times 7} \text{ or } \frac{25}{35}, \frac{21}{35}, \frac{25}{35} - \frac{21}{35} = \frac{4}{35}$$

$\therefore \frac{4}{35}$ of a yard is greater by $\frac{4}{35}$ of a yard.

(12) $\frac{1}{2}, \frac{2}{3}$; 6 is L. C. M. of den^{rs}.; \therefore fractions become

$$\frac{1 \times 3}{2 \times 3}, \frac{2 \times 2}{3 \times 2} \text{ or } \frac{3}{6}, \frac{4}{6}, \frac{4}{6} - \frac{3}{6} = \frac{1}{6}$$

$\therefore \frac{2}{3}$ of a yard is the greater by $\frac{1}{6}$ of a yard.

(13) $1\frac{7}{8}$ of $\frac{3}{11}$ of $1\frac{2}{3}$ of $\frac{2}{5} = \frac{5}{12}$; $\frac{5}{6}$ of $\frac{7}{11}$ of $5\frac{1}{2} = \frac{7}{4}$; 24 is

L. C. M. of denominators; \therefore fractions become

$$\frac{5 \times 2}{12 \times 2}, \frac{7 \times 1}{24 \times 1} \text{ or } \frac{10}{24}, \frac{7}{24}, \frac{10}{24} - \frac{7}{24} = \frac{3}{24}$$

$\therefore 1\frac{7}{8}$ of $\frac{3}{11}$ of $1\frac{2}{3}$ of $\frac{2}{5}$ is the greater by $\frac{3}{24}$ of a loaf.

Ex. XLIII. (p. 82.)

$$(1) \frac{1}{3} + \frac{2}{7} = \frac{7+6}{21} = \frac{13}{21}. \quad (2) \frac{3}{4} + \frac{2}{3} = \frac{9+8}{12} = \frac{17}{12} = 1 \frac{5}{12}.$$

$$(3) 3 + \frac{1}{2} = 3\frac{1}{2}. \quad (4) \frac{2}{4} + \frac{5}{6} = \frac{9+10}{12} = \frac{19}{12} = 1 \frac{7}{12}.$$

$$(5) \frac{5}{12} + \frac{7}{3} = \frac{25+28}{60} = \frac{53}{60}.$$

$$(6) \frac{3}{4} + \frac{7}{12} = \frac{9+7}{12} = \frac{16}{12} = 1 \frac{4}{12} = 1 \frac{1}{3}.$$

$$(7) \frac{3}{5} + \frac{5}{11} = \frac{33+25}{55} = \frac{58}{55} = 1 \frac{3}{55}.$$

$$(8) \frac{3}{8} + \frac{5}{4} = \frac{21+20}{56} = \frac{41}{56}. \quad (9) \frac{11}{36} + \frac{2}{45} = \frac{33+4}{90} = \frac{37}{90}.$$

$$(10) 1\frac{1}{3} + 1\frac{1}{6} = \frac{4}{3} + \frac{7}{6} = \frac{8+7}{6} = \frac{15}{6} = 2\frac{3}{6} = 2\frac{1}{2}.$$

$$(11) 7\frac{3}{6} + 8 = 7 + 8 + \frac{3}{6} = 15\frac{3}{6} = 15\frac{1}{2}.$$

$$(12) 1\frac{1}{3} \text{ of } 2\frac{1}{2} = \frac{4}{3} \text{ of } \frac{5}{2} = \frac{10}{3} = 3\frac{1}{3}; \quad 3\frac{1}{3} + 6\frac{1}{4} = 3+6+$$

$$\frac{1}{3} + \frac{1}{4} = 9 + \frac{4+3}{12} = 9\frac{7}{12}.$$

$$(13) \frac{3}{4} + \frac{4}{5} + \frac{7}{12} = \frac{45+48+35}{60} = \frac{128}{60} = 2\frac{8}{60} = 2\frac{2}{15}.$$

$$(14) 2\frac{3}{8} + \frac{5}{18} + 3\frac{1}{12} = 2+3+\frac{3}{8}+\frac{5}{18}+\frac{1}{12} = 5 + \frac{27+20+6}{72} =$$

$$5 + \frac{53}{72} = 5\frac{53}{72}.$$

$$(15) \frac{1}{3} \text{ of } 1\frac{3}{7} = \frac{1}{3} \text{ of } \frac{10}{7} = \frac{10}{21}; \quad 6\frac{3}{14} + \frac{10}{21} + 2\frac{7}{9} = 6+2+\frac{3}{14}$$

$$+ \frac{10}{21} + \frac{7}{9} = 8 + \frac{27+60+98}{126} = 8 + \frac{185}{126} = 9\frac{59}{126}.$$

$$(16) 9\frac{1}{2} \text{ of } 2\frac{1}{3} = \frac{19}{2} \times \frac{7}{3} = \frac{133}{6} = 22\frac{1}{6}; \quad 22\frac{1}{6} + \frac{13}{18} + \frac{1}{27} = 22$$

$$+ \frac{1}{6} + \frac{13}{18} + \frac{1}{27} = 22 + \frac{9+39+2}{54} = 22 + \frac{50}{54} = 22\frac{25}{27}.$$

$$(17) \frac{1}{3} \text{ of } (1+1\frac{1}{3}) = \frac{1}{3} \text{ of } 2\frac{1}{3} = \frac{1}{3} \text{ of } \frac{7}{3} = \frac{7}{9}; \quad \frac{2}{3} + \frac{5}{6} + \frac{7}{9} =$$

$$\frac{12+15+14}{18} = \frac{41}{18} = 2\frac{5}{18}.$$

$$(18) \frac{1}{2} + \frac{2}{3} + \frac{3}{4} + \frac{4}{5} = \frac{30+40+45+48}{60} = \frac{163}{60} = 2\frac{43}{60}.$$

$$(19) 2\frac{1}{2} + 3\frac{1}{3} + 4\frac{1}{4} + 5\frac{1}{5} = 2+3+4+5+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5} = 14 +$$

$$\frac{30+20+15+12}{60} = 14 + \frac{77}{60} = 14 + 1\frac{17}{60} = 15\frac{17}{60}.$$

$$\begin{aligned}
 (20) \quad 5\frac{7}{24} + 13\frac{5}{32} + 1\frac{3}{2} + 2\frac{23}{60} &= 5 + 13 + 2 + \frac{7}{24} + \frac{5}{32} + \frac{49}{72} + \frac{23}{60} \\
 &= 20 + \frac{1680 + 900 + 3920 + 2208}{5760} = 20 + \frac{8708}{5760} = 20 + 1 + \frac{2948}{5760} \\
 &= 20 + 1\frac{737}{1440} = 21\frac{737}{1440}
 \end{aligned}$$

$$\begin{aligned}
 (21) \quad 4\frac{5}{9} + 7\frac{7}{6} + 16\frac{9}{20} + 25\frac{13}{25} &= 4 + 16 + 25 + \frac{5}{9} + \frac{7}{15} + \frac{9}{20} + \frac{13}{25} \\
 &= 45 + \frac{500 + 420 + 405 + 468}{900} = 45 + \frac{1793}{900} = 45 + 1\frac{893}{900} \\
 &= 46\frac{893}{900}
 \end{aligned}$$

$$\begin{aligned}
 (22) \quad \frac{2}{3} \text{ of } 3\frac{1}{2} &= \frac{2}{3} \text{ of } 1\frac{1}{4} = \frac{2}{3} = 1\frac{1}{2}; \quad 3\frac{2}{9} + 16\frac{1}{3} + 7\frac{5}{12} + 1\frac{1}{2} = 3 \\
 &+ 16 + 7 + 1 + \frac{64 + 63 + 30 + 36}{72} = 27 + \frac{193}{72} = 27 + 2\frac{49}{72} \\
 &= 29\frac{49}{72}
 \end{aligned}$$

$$\begin{aligned}
 (23) \quad (2\frac{1}{4} + 3\frac{2}{3}) \text{ of } 2\frac{5}{11} + 3\frac{1}{2} \text{ of } (16\frac{1}{3} + 3\frac{1}{4}) + 1\frac{2}{3} \text{ of } 11 \text{ of } 2\frac{1}{2} &= \\
 \left(2 + 3 + \frac{3}{4} + \frac{2}{3}\right) \text{ of } \frac{27}{11} + \frac{16}{5} \text{ of } \left(16 + 3 + \frac{5}{8} + \frac{1}{4}\right) + \frac{5}{3} \text{ of } \left(11 \text{ of } \frac{45}{22}\right) &= \left(5 + \frac{9+8}{12}\right) \text{ of } \frac{27}{11} + \frac{16}{5} \text{ of } \left(19 + \frac{5+2}{8}\right) + \frac{75}{2} = \\
 6\frac{5}{12} \text{ of } \frac{27}{11} + \frac{16}{5} \text{ of } 19\frac{7}{8} + \frac{75}{2} &= \frac{77}{12} \text{ of } \frac{27}{11} + \frac{16}{5} \text{ of } \frac{159}{8} + \frac{75}{2} \\
 = \frac{63}{4} + \frac{318}{5} + \frac{75}{2} &= 15\frac{3}{4} + 63\frac{3}{5} + 37\frac{1}{2} = 15 + 63 + 37 + \frac{3}{4} + \\
 \frac{3}{5} + \frac{1}{2} &= 115 + \frac{15+12+10}{20} = 115 + \frac{37}{20} = 115 + 1\frac{17}{20} = \\
 116\frac{17}{20}
 \end{aligned}$$

$$\begin{aligned}
 (24) \quad & \pounds \frac{13}{18} + \pounds \frac{19}{24} + \pounds 3 \frac{1}{12} + \pounds 4 \frac{13}{16} + \pounds \frac{20}{48} = \pounds 2 + \pounds 3 + \pounds 4 + \\
 & \pounds \frac{13}{18} + \pounds \frac{19}{24} + \pounds \frac{1}{12} + \pounds \frac{13}{16} + \pounds \frac{20}{48} = \pounds 9 + \\
 & \pounds \frac{104+114+12+117+60}{144} = \pounds 2 \frac{119}{144} + \pounds 9 = \pounds 11 \frac{119}{144}
 \end{aligned}$$

$$\begin{aligned}
 (25) \quad & \frac{3}{10} \text{ of 4 lbs.} + \frac{5}{12} \text{ of 4 lbs.} + \frac{7}{15} \text{ of 4 lbs.} + \frac{9}{20} \text{ of 4 lbs.} + \\
 & \frac{14}{27} \text{ of 4 lbs.} + 4 \frac{11}{15} = 1 \frac{1}{3} \text{ lbs.} + 1 \frac{2}{3} \text{ lbs.} + 1 \frac{13}{15} \text{ lbs.} + 1 \frac{4}{5} \text{ lbs.} \\
 & + 2 \frac{2}{27} \text{ lbs.} + 4 \frac{11}{15} \text{ lbs.} = \left(1+1+1+1+2+4 + \frac{1}{5} + \frac{2}{3} + \frac{13}{15} + \frac{4}{5} \right. \\
 & \left. + \frac{2}{27} + \frac{11}{15} \right) \text{ lbs.} = 10 \text{ lbs.} + \frac{27+90+117+108+10+99}{135} \text{ lbs.} \\
 & = 10 \text{ lbs.} + \frac{451}{135} \text{ lbs.} = 10 \text{ lbs.} + 3 \frac{46}{135} \text{ lbs.} = 13 \frac{46}{135} \text{ lbs.}
 \end{aligned}$$

EX. XLIV. (p. 83.)

$$(1) \quad \frac{1}{4} - \frac{1}{5} = \frac{5-4}{20} = \frac{1}{20}. \quad (2) \quad \frac{1}{2} - \frac{1}{8} = \frac{4-1}{8} = \frac{3}{8}.$$

$$(3) \quad \frac{3}{4} - \frac{5}{12} = \frac{9-5}{12} = \frac{4}{12} = \frac{1}{3}. \quad (4) \quad \frac{1}{24} - \frac{1}{32} = \frac{57-52}{72} = \frac{5}{72}.$$

$$(5) \quad 3 \frac{2}{3} - 2 \frac{1}{6} = 3 - 2 + \frac{4-1}{6} = 1 + \frac{3}{6} = 1 \frac{1}{2}.$$

$$(6) \quad 7 - 2 \frac{9}{10} = 7 - 2 + \frac{10-9}{10} = 4 + \frac{1}{10} = 4 \frac{1}{10}.$$

$$(7) 10\frac{1}{12} - 8\frac{1}{9} = 10\frac{13}{12} - 9\frac{1}{9} = 1 + \left(\frac{13}{12} - \frac{1}{9}\right) = 1 + \frac{39-4}{36} = 1\frac{35}{36}.$$

$$(8) 17\frac{3}{4} - 13\frac{5}{6} = 17\frac{7}{4} - 14\frac{5}{6} = 3 + \left(\frac{7}{4} - \frac{5}{6}\right) = 3 + \frac{21-10}{12} = 3\frac{11}{12}.$$

$$(9) 1\frac{4}{25} - \frac{3}{4} = 1\frac{29}{25} - 1\frac{3}{4} = \frac{116-75}{100} = \frac{41}{100}$$

$$(10) 4\frac{3}{7} - 2\frac{17}{20} = 4\frac{10}{7} - 3\frac{17}{20} = 1 + \frac{200-119}{140} = 1 + \frac{81}{140} = 1\frac{81}{140}.$$

$$(11) 15\frac{3}{7} - 7\frac{2}{3} = 15\frac{10}{7} - 8\frac{2}{3} = 7 + \frac{30-14}{21} = 7 + \frac{16}{21} = 7\frac{16}{21}.$$

$$(12) 20\frac{5}{8} - 8\frac{3}{5} = 20\frac{23}{18} - 9\frac{3}{56} = 11 + \frac{644-27}{504} = 11 + \frac{617}{504} = 11 + 1\frac{113}{504} = 12\frac{113}{504}.$$

$$(13) 1 - \frac{3}{5} = \frac{5-3}{5} = \frac{2}{5}; \quad \frac{3}{5} - \frac{2}{5} = \frac{1}{5}.$$

$$(14) \quad (1) \frac{13}{12} - \frac{7}{36} = \frac{39-7}{36} = \frac{32}{36} = \frac{8}{9};$$

$$(2) 8\frac{1}{2} - 2\frac{4}{5} = 8\frac{3}{2} - 3\frac{4}{5} = 5 + \frac{3}{2} - \frac{4}{5} = 5 + \frac{15-8}{10} = 5\frac{7}{10}.$$

$$(15) \frac{5}{8} \text{ d.} - \frac{5}{9} \text{ d.} = \frac{45-40}{72} \text{ d.} = \frac{5}{72} \text{ d.}$$

EX. XLV. (p. 84.)

$$(1) \frac{1}{6} + 2\frac{1}{7} + 13\frac{3}{10} - 3\frac{3}{7} = 2 + 13 - 3 + \frac{1}{6} + \frac{1}{7} + \frac{3}{10} - \frac{3}{7} = 12$$

$$+ \frac{35 + 30 + 63 - 9}{210} = 12 + \frac{119}{210} = 12\frac{119}{210}.$$

$$(2) \frac{1}{4} - \frac{3}{8} + \frac{5}{6} - \frac{1}{2} = \frac{6 - 9 + 20 - 13}{24} = \frac{6 + 20 - 9 - 13}{24}$$

$$= \frac{4}{24} = \frac{1}{6}.$$

$$(3) 12\frac{1}{7} - \frac{3}{4} + 7\frac{1}{6} - \frac{1}{8} \text{ of } \frac{1}{7} + \frac{2}{3} \text{ of } 3\frac{3}{4} = 12\frac{11}{17} - \frac{21}{34} + 7\frac{16}{51}$$

$$- \frac{16}{51} + \frac{3}{2} = 12 + 7 + 1 + \frac{11}{17} - \frac{21}{34} + \frac{16}{51} - \frac{16}{51} + \frac{1}{2} = 20 +$$

$$\frac{66 - 63 + 32 - 32 + 51}{102} = 20 + \frac{54}{102} = 20\frac{9}{17}.$$

$$(4) (16\frac{1}{2} - 3\frac{1}{4}) \text{ of } 3\frac{1}{5} - 16\frac{1}{8} + (3\frac{1}{4} \text{ of } 3\frac{1}{5}) = \left(16 - 3 + \frac{5-2}{8}\right)$$

$$\text{of } \frac{16}{5} - 16\frac{5}{8} + \left(\frac{13}{4} \text{ of } \frac{16}{5}\right) = 13\frac{3}{8} \times \frac{16}{5} - 16\frac{5}{8} + 10\frac{2}{5} = \frac{107}{8}$$

$$\times \frac{16}{5} - 16\frac{5}{8} + 10\frac{2}{5} = 42\frac{4}{5} - 16\frac{5}{8} + 10\frac{2}{5} = 42 - 16 + 10 +$$

$$\frac{32 - 25 + 16}{40} = 36 + \frac{23}{40} = 36\frac{23}{40}.$$

$$(5) 6\frac{1}{4} + \frac{7}{12} \text{ of } \frac{3}{4} \text{ of } 3\frac{1}{2} - \frac{45}{60} - 5\frac{3}{4} = 6\frac{1}{4} + \left(\frac{7}{12} \times \frac{9}{14} \times \frac{10}{3}\right) -$$

$$\frac{45}{60} - 5\frac{3}{4} = 6 + 1 - 5 + \frac{15 + 15 - 45 - 45}{60} = 1 + \frac{60 - 60}{60} = 1.$$

$$\begin{aligned}
 (6) \quad 6\frac{1}{4} + \frac{7}{12} \text{ of } \frac{9}{14} \text{ of } (3\frac{1}{2} - \frac{45}{60}) - 5\frac{3}{4} &= 6\frac{1}{4} + \frac{7}{12} \text{ of } \frac{9}{14} \text{ of} \\
 \left(3\frac{4}{5} - 1\frac{45}{60}\right) - 5\frac{3}{4} &= 6\frac{1}{4} + \frac{7}{12} \text{ of } \frac{9}{14} \text{ of } \left(2 + \frac{80-45}{60}\right) - 5\frac{3}{4} \\
 &= 6\frac{1}{4} + \frac{7}{12} \text{ of } \frac{9}{14} \text{ of } \frac{31}{12} - 5\frac{3}{4} = 6\frac{1}{4} + \frac{31}{32} - 5\frac{3}{4} = 6 - 5 + \\
 &\quad \frac{8+31-24}{32} = 1\frac{15}{32}.
 \end{aligned}$$

$$\begin{aligned}
 (7) \quad 5\frac{89}{120} - \left(\frac{4}{5} + \frac{7}{8} + \frac{11}{12}\right) &= 5\frac{89}{120} - \left(\frac{96+105+110}{120}\right) = \\
 5\frac{89}{120} - 2\frac{71}{120} &= 5 - 2 + \frac{89-71}{120} = 3 + \frac{18}{120} = 3\frac{3}{20}.
 \end{aligned}$$

$$\begin{aligned}
 (8) \quad \frac{1}{3} \text{ of } \frac{3}{4} &= \frac{1}{4} = \text{B's pur.}; \quad \frac{3}{4} - \frac{1}{4} = \frac{2}{4} = \frac{1}{2} \text{ rem'r.} \\
 \frac{1}{3} \text{ of } \frac{1}{2} &= \frac{1}{6} = \text{C's pur.}; \quad \frac{1}{2} - \frac{1}{6} = \frac{3-1}{6} = \frac{2}{6} = \frac{1}{3} \text{ rem'r.} \\
 \frac{1}{3} \text{ of } \frac{1}{3} &= \frac{1}{9} = \text{D's pur.}; \quad \frac{1}{3} - \frac{1}{9} = \frac{3-1}{9} = \frac{2}{9} = \text{A's rem'r.}
 \end{aligned}$$

EX. XLVI. (p. 86.)

$$(1) \quad \frac{1}{2} \times \frac{3}{4} = \frac{1}{12}. \quad (2) \quad \frac{7}{9} \times \frac{5}{8} = \frac{35}{72}. \quad (3) \quad \frac{1}{3} \times \frac{5}{2} = \frac{5}{6}.$$

$$(4) \quad \frac{7}{8} \times \frac{2}{21} = \frac{1}{12}. \quad (5) \quad 7\frac{1}{2} \times 3\frac{1}{2} = \frac{15}{2} \times \frac{10}{3} = 25.$$

$$(6) \quad \frac{3}{4} \text{ of } \frac{1}{5} \times 17\frac{1}{2} = \frac{3}{4} \times \frac{1}{5} \times \frac{35}{2} = \frac{21}{8} = 2\frac{5}{8}.$$

$$(7) \quad \frac{7}{12} \text{ of } 1\frac{1}{2} \times 3\frac{3}{5} \times \frac{1}{3} = \frac{7}{12} \times \frac{8}{7} \times \frac{63}{20} \times \frac{13}{84} = \frac{13}{40}.$$

$$(8) \quad \frac{5}{6} \times 3\frac{3}{11} \times 19\frac{1}{2} \times \frac{1}{2} = \frac{5}{6} \times \frac{35}{11} \times \frac{96}{5} \times \frac{11}{53} = 10.$$

$$(9) \frac{7}{18} \text{ of } 1\frac{1}{10} \text{ of } 11\frac{1}{4} \times 2\frac{1}{2} \times 2\frac{2}{7} = \frac{7}{18} \times \frac{11}{10} \times \frac{27}{14} \times \frac{5}{2} \times \frac{16}{7} =$$

$$\frac{33}{7} = 4\frac{5}{7}.$$

$$(10) \frac{1}{16} \text{ of } 3\frac{3}{4} \times 4\frac{1}{8} \text{ of } 2\frac{1}{2} \times 13 = \frac{11}{16} \times \frac{15}{4} \times \frac{24}{5} \times \frac{45}{22} \times \frac{13}{1} =$$

$$\frac{5265}{16} = 329\frac{1}{16}.$$

$$(11) 2\frac{1}{3} \text{ of } (4\frac{1}{5} + 3\frac{5}{4}) \times \frac{1}{9} \text{ of } 2\frac{1}{9} \times 1\frac{1}{69} = \frac{57}{23} \times \left(4 + 3 + \frac{14+25}{70}\right) \times \frac{11}{91} \times \frac{39}{19} \times \frac{70}{69} = \frac{57}{23} \times \frac{529}{70} \times \frac{11}{91} \times \frac{39}{19} \times \frac{70}{69} = \frac{33}{7}$$

$$= 4\frac{5}{7}.$$

$$(12) (3\frac{5}{6} - 1\frac{7}{12} + 1\frac{1}{9} - 2\frac{1}{2}) \times 38\frac{1}{4} \text{ of } \frac{2}{17} = \left(3 - 1 + 1 - 2 + \frac{60-42+32-11}{72}\right) \times \frac{153}{4} \times \frac{2}{17} = \frac{37}{24} \times \frac{153}{4} \times \frac{2}{17} = \frac{111}{16} = 6\frac{15}{16}.$$

$$(13) \frac{4}{5} \text{ of } (\frac{1}{8} + \frac{1}{6} - \frac{1}{18} + \frac{1}{9}) \times \frac{2}{3} \text{ of } (2\frac{3}{16} + \frac{5}{8}) = \frac{3}{4} \text{ of } \left(\frac{15+9-12+5}{45}\right) \times \frac{2}{3} \text{ of } \left(2 + \frac{3+10}{16}\right) = \frac{3}{4} \times \frac{17}{45} \times \frac{2}{3} \times \frac{45}{16}$$

$$= \frac{17}{32}.$$

$$(14) \left\{\left(\frac{1}{2} + \frac{1}{3}\right) \text{ of } \left(1\frac{1}{2} + 2\frac{3}{4}\right)\right\} \times \left\{\left(2\frac{1}{4} - 1\frac{1}{2}\right) \text{ of } \left(3\frac{1}{10} - \frac{7}{5}\right)\right\} =$$

$$\left(\frac{3+2}{6}\right) \times \left(1 + 2 + \frac{4+9}{12}\right) \times \left(2 - 1 + \frac{1-7}{14}\right) \text{ of } \left(3 + \frac{7-30}{70}\right)$$

$$= \frac{5}{6} \times \frac{49}{12} \times \frac{4}{7} \times \frac{187}{70} = \frac{187}{36} = 5\frac{7}{36}.$$

$$(15) \left\{ 1\frac{3}{7} \text{ of } 26\frac{1}{2} \text{ of } (1 - \frac{2}{3}) \right\} \times \left\{ 2\frac{5}{8} \text{ of } (4\frac{1}{5} - 3\frac{2}{3}) \text{ of } \frac{45}{106} \right\} \\
\frac{10}{7} \text{ of } \frac{53}{2} \text{ of } \frac{1}{3} \times \left(2\frac{5}{8} \text{ of } \frac{8}{15} \text{ of } \frac{45}{106} \right) = \frac{10}{7} \times \frac{53}{2} \times \frac{1}{3} \times \frac{21}{8} \times \\
\frac{8}{15} \times \frac{45}{106} = \frac{15}{2} = 7\frac{1}{2}.$$

Ex. XLVII. (p. 86.)

$$(1) \frac{1}{20} \div \frac{5}{7} = \frac{15 \times 7}{20 \times 5} = \frac{21}{20} = 1\frac{1}{20}.$$

$$(2) \frac{2}{5} \div \frac{3}{5} = \frac{2 \times 5}{5 \times 3} = \frac{2}{3}.$$

$$(3) \frac{6}{11} \div \frac{3}{5} = \frac{6 \times 5}{11 \times 3} = \frac{10}{11}.$$

$$(4) 4\frac{5}{6} \div 6\frac{7}{8} = \frac{29}{6} \div \frac{55}{8} = \frac{29 \times 8}{6 \times 55} = \frac{116}{165}.$$

$$(5) 56 \div 5\frac{4}{7} = 56 \div \frac{40}{7} = \frac{56 \times 7}{1 \times 40} = \frac{49}{5} = 9\frac{4}{5}.$$

$$(6) 7\frac{5}{7} \div 4\frac{2}{21} = \frac{54}{7} \div \frac{86}{21} = \frac{54 \times 21}{7 \times 86} = \frac{81}{43} = 1\frac{38}{43}.$$

$$(7) \frac{1}{3} \text{ of } 20\frac{3}{4} \div 10\frac{3}{8} = \frac{1}{3} \times \frac{83}{4} \div \frac{83}{8} = \frac{83}{12} \times \frac{8}{83} = \frac{2}{3}.$$

$$(8) \frac{3}{5} \text{ of } 5\frac{1}{2} \div \frac{5}{22} \text{ of } 9 = \frac{3}{5} \times \frac{11}{2} \div \frac{5}{22} \times \frac{9}{1} = \frac{33}{10} \div \frac{45}{22} = \\
\frac{33 \times 22}{10 \times 45} = 1\frac{46}{75}.$$

$$(9) (\frac{3}{5} \text{ of } 7\frac{1}{2} - \frac{8}{17}) \div 1\frac{2}{9} = \left\{ \left(\frac{3}{5} \times \frac{15}{2} \right) - \frac{8}{17} \right\} \div \frac{11}{9} = \\
\left(\frac{9}{2} - \frac{8}{17} \right) \div \frac{11}{9} = \frac{137}{34} \div \frac{11}{9} = \frac{137 \times 9}{34 \times 11} = 3\frac{111}{374}.$$

$$(10) \left(\frac{1}{3} + \frac{8}{4} - \frac{1}{2}\right) \div \left(\frac{1}{3} + \frac{2}{3}\right) = \frac{4+15-10}{20} \div \frac{12+10}{15} = \frac{9}{20} \div \frac{22}{15} = \frac{9 \times 15}{20 \times 22} = \frac{27}{88}.$$

$$(11) 6\frac{1}{4} \div 216 = \frac{27}{4} \div 216 = \frac{27 \times 1}{4 \times 216} = \frac{1}{32}.$$

$$(12) \frac{3}{4} \div 2 = \frac{3 \times 1}{4 \times 2} = \frac{3}{8}.$$

$$(13) \frac{4+\frac{1}{4}}{4-\frac{1}{4}} = \frac{4\frac{1}{4}}{3\frac{3}{4}} = \frac{17}{4} \div \frac{15}{4} = \frac{17 \times 4}{4 \times 15} = \frac{17}{15} = 1\frac{2}{15};$$

$$2 \text{ is the next whole number; } 2 - 1\frac{2}{15} = \frac{13}{15}.$$

Ex. XLVIII. (p. 87.)

$$(1) \frac{6\frac{1}{7}}{3\frac{1}{9}} = \frac{43}{7} \div \frac{28}{9} = \frac{43}{7} \times \frac{9}{28} = \frac{387}{196} = 1\frac{191}{196}.$$

$$(2) \frac{6}{2\frac{1}{4}} = 6 \div \frac{5}{4} = 6 \times \frac{4}{5} = \frac{24}{5} = 2\frac{4}{5}.$$

$$(3) \frac{2\frac{1}{4}}{6} = \frac{5}{4} \div 6 = \frac{5}{4} \times \frac{1}{6} = \frac{5}{24}.$$

$$(4) \frac{6\frac{5}{12}}{3\frac{3}{8}} = \frac{77}{12} \div \frac{27}{8} = \frac{77}{12} \times \frac{8}{27} = \frac{7}{9} = 1\frac{2}{9}.$$

$$(5) \frac{5}{2\frac{5}{8}} = 5 \div \frac{21}{8} = 5 \times \frac{8}{21} = \frac{40}{21} = 1\frac{19}{21}.$$

$$(6) \frac{\frac{7}{48}}{4\frac{1}{36}} = \frac{7}{48} \div \frac{145}{36} = \frac{7}{48} \times \frac{36}{145} = \frac{28}{725}.$$

$$(7) \frac{1\frac{2}{3} \text{ of } 1\frac{1}{7}}{1\frac{2}{3} \text{ of } \frac{6}{11}} = \frac{\frac{7}{4} \times \frac{8}{7}}{\frac{5}{3} \times \frac{6}{11}} = 2 \times \frac{11}{10} = \frac{11}{5} = 2\frac{1}{5}.$$

$$(8) \frac{\frac{7}{9} + \frac{2}{7}}{2\frac{3}{7}} = \frac{\frac{76}{63}}{\frac{17}{7}} = \frac{76}{63} \times \frac{7}{17} = \frac{76}{153}.$$

$$(9) \frac{5\frac{1}{2} + 6\frac{2}{3}}{6\frac{2}{3} - 5\frac{1}{2}} = \frac{11\frac{1}{3}}{1\frac{1}{6}} = \frac{157}{14} = 15\frac{7}{14} \times \frac{1}{14} = \frac{157}{196} = 12\frac{1}{14}.$$

$$(10) \frac{\frac{1}{2\frac{1}{2}} + \frac{1}{3\frac{1}{2}} + \frac{1}{4\frac{1}{2}}}{\frac{8}{9} + \frac{5}{6} - 1\frac{1}{2}} = \frac{\frac{2}{5} + \frac{3}{10} + \frac{1}{15}}{\frac{8}{9} + \frac{5}{6} - 1\frac{1}{2}} = \frac{1\frac{59}{30}}{\frac{3}{8}} = 1\frac{59}{24} \times \frac{36}{9} = 12\frac{397}{60}$$

$$(11) \left\{ \frac{3\frac{1}{2}}{7} + \frac{2}{10\frac{1}{2}} - \frac{1}{3} \text{ of } \frac{1}{4} \right\} \times 1\frac{3}{4} = \left(\frac{1}{2} + \frac{1}{5} - \frac{1}{6} \right) \times \frac{7}{4} = \frac{32}{3} \times \frac{7}{4} = \frac{8}{9}.$$

$$(12) \left(\frac{5\frac{1}{2}}{31\frac{5}{6}} \text{ of } \frac{9}{14} \right) \div \left(\frac{3\frac{2}{3}}{3\frac{1}{2}} \text{ of } 15 \right) = \frac{1}{7} \times \frac{6}{191} \times \frac{9}{14} \div \frac{1}{3} \times \frac{1}{15} \times 15 = \frac{1080}{9359} \div \frac{1}{3} = \frac{1080}{9359} \times \frac{3}{1} = \frac{810}{102949}.$$

$$(13) \frac{5\frac{2}{7} \div 7\frac{2}{5}}{2\frac{8}{9} - 1\frac{1}{7}} \text{ of } \frac{2\frac{1}{2} \times 8\frac{1}{2}}{4\frac{1}{9} \div (\frac{1}{5} - \frac{1}{9})} = \frac{5}{7} \text{ of } \frac{7\frac{5}{4}}{2\frac{11}{1}} = \frac{25}{44}.$$

$$(14) \frac{13}{2\frac{2}{3} + \frac{1}{4}} + \frac{1\frac{1}{2}}{2\frac{1}{6}} - 1\frac{3}{6} = 4\frac{1}{36} + \frac{5}{12} - 1\frac{3}{6} = 3\frac{152}{1680}.$$

Ex. XLIX. (p. 88.)

$$(1) \frac{2}{5} \text{ of } \$1 = \frac{2 \times 100}{5} \text{ cts.} = 40 \text{ cts.}$$

$$(2) \frac{3}{8} \text{ ml.} = \frac{3 \times 8}{8} \text{ fur.} = 3 \text{ fur.}$$

$$(3) \frac{3}{7} \text{ cwt.} = \frac{3 \times 4}{7} \text{ qrs.} = 1\frac{5}{7} \text{ qrs.; } \frac{5}{7} \text{ qr.} = \frac{5 \times 25}{7} \text{ lbs.} = 17\frac{6}{7} \text{ lbs.; } \frac{6}{7} \text{ lb.} = \frac{6 \times 16}{7} \text{ oz.} = 13\frac{5}{7} \text{ oz.; } \frac{5}{7} \text{ oz.} = \frac{5 \times 16}{7} \text{ drs.} =$$

$$11\frac{3}{7} \text{ drs.; } \therefore \text{ value is 1 qr., 17 lbs., 13 oz., } 11\frac{3}{7} \text{ drs.}$$

$$(4) \frac{9}{20} \text{ of 2 tons, 3 cwt.} = \frac{9 \times 43}{20} \text{ cwt.} = 19 \frac{7}{20} \text{ cwt.; } \frac{7}{20} \text{ cwt.}$$

$$= \frac{7 \times 4}{20} \text{ qrs.} = 1 \frac{8}{20} \text{ qrs.; } \frac{8}{20} \text{ qrs.} = \frac{8 \times 25}{20} \text{ lbs.} = 10 \text{ lbs.;}$$

\therefore value is 19 cwt. 1qr. 10 lbs.

$$(5) \frac{3}{16} \text{ of 3 mls., 2 fur.,} = \frac{3 \times 26}{16} \text{ fur.} = 4 \frac{7}{8} \text{ fur.; } \frac{7}{8} \text{ fur.} =$$

$$\frac{7 \times 40}{8} \text{ per.} = 35 \text{ per.; } \therefore \text{ value is 4 fur. 35 per.}$$

$$(6) \frac{4}{5} \text{ of 3 ac., 2 per., 3 yds.} = \frac{(3 \text{ ac., 2 per., 3 yds.}) \times 4}{5} =$$

$$\frac{12 \text{ ac., 8 per., 12 yds.}}{5} = 2 \text{ ac., 1 ro., 25 per., 20 yds., 4 ft.,}$$

$136 \frac{1}{2} \text{ in.}$

$$(7) \frac{5}{6} \text{ of 5 lbs., 13 dwts.} = \frac{(5 \text{ lbs., 13 dwts.}) \times 5}{6} =$$

$$\frac{25 \text{ lbs., 3 oz., 5 dwts.}}{6} = 4 \text{ lbs., 2 oz., 10 dwts., 20 grs.}$$

$$(8) \frac{7}{8} \text{ of 68 yds., 2 nls.} = \frac{(68 \text{ yds., 2 nls.}) \times 7}{8} =$$

$$\frac{476 \text{ yds., 3 qrs., 2 nls.}}{8} = 59 \text{ yds., 2 qrs., } 1 \frac{3}{4} \text{ nls.}$$

$$(9) \frac{3}{11} \text{ of £26 8s. 11d.} = \frac{(\text{£26 8s. 11d.}) \times 3}{11} =$$

$$\frac{\text{£79 6s. 9d.}}{11} = \text{£7 4s. 3d.}$$

$$(10) \frac{6}{7} \text{ of 128 lbs., 2 sc.} = \frac{(128 \text{ lbs., 2 sc.}) \times 6}{7} =$$

$$\frac{768 \text{ lbs., 4 drs.}}{7} = 109 \text{ lbs., 8 oz., 5 drs. } 8 \frac{4}{7} \text{ grs.}$$

$$(11) \frac{7}{8} \text{ of } \frac{3}{5} \text{ of } 10\frac{2}{3} \text{ hrs.} = \frac{23}{5} \text{ hrs.} = 5\frac{3}{5} \text{ hrs.}; \frac{3}{5} \text{ hrs.} = 36 \text{ min.}; \therefore \text{value is 5 hrs., 36 min.}$$

$$(12) \frac{3}{5} \text{ lbs.} = 9\frac{3}{5} \text{ oz.}; \frac{3}{5} \text{ oz.} = 9\frac{3}{5} \text{ drs.}; 7 \text{ lbs., } 9 \text{ oz., } 9\frac{3}{5} \text{ drs.}$$

$$(13) \frac{6}{7} \text{ of } \frac{2}{3} \text{ of } \$42 = \frac{4}{7} \text{ of } \$42 = \$24.$$

$$(14) \frac{3}{10} \text{ dy.} = 7\frac{1}{5} \text{ hrs.}; \frac{1}{5} \text{ hr.} = 12 \text{ min.}; 7 \text{ hrs. } 12 \text{ min.}$$

$$(15) \frac{9}{16} \text{ of } 24 \text{ cds.} = 13\frac{1}{2} \text{ cds.}; \frac{1}{2} \text{ cd.} = 64 \text{ c. ft.};$$

$$\therefore \text{value is 13 cds., 64 c. ft.}$$

EX L. (p. 88.)

$$(1) 2s. 4d. = 40d., £1 = 240d.; \therefore \text{fract}^n. = \frac{40}{240} = \frac{1}{6}.$$

$$(2) 2 \text{ r., } 13 \text{ per.} = 93 \text{ per., } 3 \text{ ac.} = 480 \text{ per.}; \therefore \text{fract}^n. = \frac{93}{480} = \frac{31}{160}.$$

$$(3) 3 \text{ wks., } 16 \text{ min.} = 30256 \text{ min., } \frac{1}{4} \text{ hr.} = 30 \text{ min.};$$

$$\therefore \text{fract}^n. = \frac{30256}{30} = \frac{15128}{15}.$$

$$(4) 1 \text{ lb., } 1 \text{ oz., } 3 \text{ dwts.} = 263 \text{ dwts., } 2 \text{ lbs.} = 480 \text{ dwts.};$$

$$\therefore \text{fract}^n. = \frac{263}{480}.$$

$$(5) 1 \text{ lb., } 5 \text{ oz.} = 408 \text{ sc., } 2 \text{ lbs., } 1 \text{ sc.} = 577 \text{ sc.};$$

$$\therefore \text{fract}^n. = \frac{408}{577}.$$

(6) 8 ac., 3 r. = 1400 per., 2 ac., 32 per. = 352 per.;

$$\therefore \text{fract}^n = \frac{1400}{352} = \frac{175}{44}.$$

(7) 4 yds., 2 ft., 120 in. = 3000 in., 3 per., $13\frac{1}{4}$ yds., 1 ft.,

$$72 \text{ in.} = 135000 \text{ in.}; \therefore \text{fract}^n = \frac{3000}{135000} = \frac{1}{45}.$$

(8) £1 18s. = 33s., £7 = 140s.; $\therefore \text{fract}^n = \frac{38}{140} = \frac{19}{70}.$

(9) 2 bu., 1 pk. = 18 gals., 4 bu., 1 gal. = 33 gals.;

$$\therefore \text{fract}^n = \frac{18}{33} = \frac{6}{11}.$$

(10) \$209, \$5643; $\therefore \text{fract}^n = \frac{209}{5643} = \frac{6}{11}.$

(11) 2 yds., 2 ft. = 96 in., 13 per., 3 yds., 6 in. = 2688 in.;

$$\therefore \text{fract}^n = \frac{96}{2688} = \frac{1}{28}.$$

(12) 1 lb. Troy, = 5760 grs., 1 lb. avoird. = 7000 grs.;

$$\therefore \text{fract}^n = \frac{5760}{7000} = \frac{144}{175}.$$

(13) 3 qts., 7 bu. = 224 qts.; $\therefore \text{fract}^n = \frac{3}{224}.$

(14) $1\frac{1}{2}$ yds. = 54 in., 4 mls., 2 fur. = 269280 in.;

$$\therefore \text{fract}^n = \frac{54}{269280} = \frac{3}{14960}.$$

(15) 1 yd. 4 in. = 1300 in., 5 ac., 11 per. = 31402404 in.;

$$\therefore \text{fract}^n = \frac{1300}{31402404} = \frac{325}{7850601}.$$

Ex. LI. (p. 89.)

$$(1) \frac{\frac{2}{7} \text{ of } \$14}{\frac{1}{2} \text{ of } \$16} = \frac{2}{7} \times \frac{14}{1} \times \frac{2}{1} \times \frac{1}{16} = \frac{1}{2}.$$

$$(2) \frac{\frac{2}{5} \text{ of } 2 \text{ ac., } 2 \text{ ro.}}{\frac{1}{9} \text{ of } 3 \text{ ac., } 2 \text{ per.}} = \frac{\frac{2}{5} \text{ of } 400 \text{ per.}}{\frac{1}{9} \text{ of } 482 \text{ per.}} = \frac{3}{5} \times \frac{400}{1} \times \frac{9}{1} \times \frac{1}{482} \\ = \frac{1080}{241}.$$

$$(3) \frac{2\frac{1}{2} \text{ of } 3 \text{ lbs., } 6 \text{ dwt.}}{1\frac{1}{2} \text{ of } 6 \text{ lbs., } 12 \text{ grs.}} = \frac{\frac{5}{2} \text{ of } 17424 \text{ grs.}}{\frac{3}{2} \text{ of } 34572 \text{ grs.}} = \frac{5}{2} \times \frac{17424}{1} \\ \times \frac{3}{4} \times \frac{1}{34572} = \frac{5445}{5762}.$$

$$(4) \frac{12\frac{3}{4} \text{ of } 3\text{s. } 6\text{d.}}{\text{£}1} = \frac{\frac{51}{4} \text{ of } 42\text{d.}}{240\text{d.}} = \frac{51}{4} \times \frac{42}{1} \times \frac{1}{240} = \frac{357}{160}.$$

$$(5) \frac{3\frac{1}{2} \text{ of } 10 \text{ cwt., } 2 \text{ qrs.}}{1 \text{ Ton.}} = \frac{\frac{10}{2} \text{ of } 42 \text{ qrs.}}{80 \text{ qrs.}} = \frac{10}{3} \times \frac{42}{1} \times \frac{1}{80} = \frac{7}{4}.$$

$$(6) \frac{3\frac{1}{2} \text{ of } 2 \text{ ac., } 3 \text{ ro.}}{2 \text{ ro., } 2\frac{1}{2} \text{ per.}} = \frac{\frac{7}{2} \text{ of } 880 \text{ hf. per.}}{165 \text{ hf. per.}} = \frac{7}{2} \times \frac{880}{1} \times \\ \frac{1}{165} = \frac{56}{3}.$$

$$(7) \frac{\frac{5}{8} \text{ of } 1 \text{ lb. Troy}}{1 \text{ lb. Avoir.}} = \frac{\frac{5}{8} \text{ of } 5760 \text{ grs.}}{7000 \text{ grs.}} = \frac{5}{8} \times \frac{5760}{1} \times \frac{1}{7000} = \frac{18}{35}.$$

$$(8) 1\frac{3}{17} \text{ of } \frac{\text{£}2 \text{ } 4\text{s. } 7\frac{1}{2}\text{d.}}{2\text{s.}} = \frac{\frac{20}{17} \text{ of } 1071 \text{ half-pence}}{120 \text{ half-pence}} = \frac{20}{17} \times \\ \frac{1071}{1} \times \frac{1}{120} = \frac{21}{2}.$$

$$(9) \frac{\frac{3}{11} \text{ of } 2\frac{1}{2} \text{ mls.}}{\frac{1}{2} \text{ of } \frac{2}{9} \text{ mls.}} = \frac{\frac{3}{11} \text{ of } \frac{11}{2} \text{ mls.}}{\frac{1}{2} \text{ of } \frac{2}{9} \text{ mls.}} = \frac{3}{11} \times \frac{11}{4} \times \frac{2}{1} \times \frac{9}{2} = \frac{27}{4}.$$

$$(10) \frac{6\frac{1}{2} \text{ of } 3 \text{ cords}}{5 \text{ cord ft.}} = \frac{\frac{13}{2} \text{ of } 24 \text{ cd. ft.}}{5 \text{ cd. ft.}} = \frac{13}{2} \times \frac{24}{1} \times \frac{1}{5} = \frac{156}{5}.$$

$$(11) \frac{8\frac{1}{2} \text{ of } 6 \text{ lbs., } 2 \text{ sc.}}{1 \text{ lb.}} = \frac{2\frac{1}{2} \text{ of } 1730 \text{ sc.}}{288 \text{ sc.}} = \frac{25}{3} \times \frac{1730}{1} \times$$

$$\frac{1}{288} = \frac{21625}{432}.$$

$$(12) \frac{\frac{4}{7} \text{ of } \frac{2}{3} \text{ of } \$21}{\$7} = \frac{4}{7} \times \frac{2}{3} \times \frac{21}{1} \times \frac{1}{7} = \frac{8}{7}.$$

$$(13) \frac{\frac{9}{16} \text{ of } 8 \text{ yds., } 2 \text{ nls.}}{2\frac{1}{2} \text{ ells Eng.}} = \frac{\frac{9}{16} \text{ of } 130 \text{ nls.}}{1\frac{3}{4} \text{ nls.}} = \frac{9}{16} \times \frac{130}{1} \times$$

$$\frac{3}{140} = \frac{351}{224}.$$

$$(14) \frac{2\frac{7}{8} \text{ of } 10 \text{ hrs.}}{1 \text{ dy.}} = \frac{2\frac{3}{4} \text{ of } 10 \text{ hrs.}}{24 \text{ hrs.}} = \frac{23}{8} \times \frac{10}{1} \times \frac{1}{24} = \frac{115}{96}.$$

EX. LII. (p. 92.)

- (1) $\frac{3}{4}$ of $\frac{4}{5} = \frac{3}{5}$ = what A sells to C .
 $\frac{1}{12}$ of $\frac{4}{5} = \frac{1}{15}$ = what A sells to B .
 $\frac{4}{5} - (\frac{3}{5} + \frac{1}{15}) = \frac{2}{15}$ = A 's remaining portion
 $\frac{1}{15} + \frac{1}{5} = \frac{2}{15}$ = B 's portion.
 $\frac{3}{5}$ = C 's portion.

- (2) (1) $9 \div \frac{3}{8} = 24$.

$$(2) 4\frac{1}{2} + 3\frac{9}{10} = 8\frac{3}{2}; 4\frac{1}{2} - 3\frac{9}{10} = \frac{3}{2}; 8\frac{3}{2} - \frac{3}{2} = 7\frac{1}{2}.$$

- (3) Lesser fraction = $(\frac{3}{5} - \frac{2}{5}) \div 2 = \frac{1}{10}$.
 Greater fraction = $\frac{3}{5} - \frac{1}{10}$ or $\frac{1}{10} + \frac{8}{10} = \frac{9}{10}$.

- (4) (1) $1\frac{1}{2}$ of $2\frac{2}{3} = 2\frac{2}{3}$; $3\frac{3}{4} \div \frac{7}{2} \times \frac{2}{3} = 1\frac{1}{2}$.

$$(2) \frac{1}{3} \text{ of } 2\frac{1}{4} = \frac{5}{6}; 3\frac{3}{4} - \frac{5}{6} = 1\frac{2}{3}.$$

- (5) A gives B $\frac{1}{5}$ of his money; \therefore he has $\frac{4}{5}$ rem'g.
 He then gives C $\frac{1}{2}$ of $\frac{4}{5} = \frac{2}{5}$ and has rem'g $\frac{4}{5} - \frac{2}{5} = \frac{2}{5}$.
 He next gives D $\frac{1}{3}$ of $\frac{2}{5} = \frac{2}{15}$ and has rem'g $\frac{2}{5} - \frac{2}{15} = \frac{4}{15}$.
 $\therefore A$ has $\frac{4}{15}$ and D has $\frac{2}{15}$; or A has twice as much as D .

- (6) She spends $\frac{1}{3}$ leaving $\frac{2}{3}$; next spends $\frac{2}{3}$ of $\frac{2}{3} = \frac{1}{3}$; hence she has spent $\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$, and has left $\frac{1}{3}$, which by question = \$4.20; \therefore her whole sum was \$1.20 $\times 6 = \$7.20$.

- (7) $\frac{1}{11} = \$90$; $\therefore \frac{1}{11} = \30 ; \therefore value of vessel $= \$30 \times 11 = \330 . $\therefore \frac{1}{3} = \110 .
- (8) $100 \text{ cts.} - 5 \text{ cts.} = 95 \text{ cts.}$; \therefore whole income $= \frac{100}{95}$ of $\$855 = \900 .
- (9) $\frac{4}{6} = \frac{2}{3}$ = amount of reduction; hence $\frac{2}{3}$ of $\$54 = \36 = amount of reduction.
- (10) $\frac{1}{4}$ of a rabbit is worth $\frac{2}{3} \text{ s.}$; $\therefore \frac{1}{7}$ is worth $\frac{1}{6} \text{ s.} = 2 \text{ d.}$ and a rabbit is worth $2 \text{ d.} \times 7 = 1 \text{ s. } 2 \text{ d.}$; $\therefore \frac{3}{8}$ of a rabbit is worth $8\frac{1}{2} \text{ d.} =$ the worth of $\frac{1}{20}$ of a pig; \therefore a pig is worth $20 \times 8\frac{1}{2} \text{ d.} = 14 \text{ s.}$ and 100 pigs are worth $100 \times 14 \text{ s.} = \text{£}70$.
- (11) 1 rifleman shoots $2\frac{5}{7}$ rounds in 91 minutes or in 1 minute $\frac{25}{7 \times 91} = \frac{2}{49}$ of a round; \therefore 37 riflemen in $4\frac{1}{4} \text{ hrs.}$ (or 255 min.) will shoot $(\frac{2}{49} \times 37 \times 255)$ rounds $= 385\frac{5}{7}$ rounds.
- (12) $\frac{2}{3} = \$12.60$; $\therefore \frac{1}{3} = \4.20 , and whole $= 8 \times \$4.20 = \33.60 .
- (13) 28 sheep eat as much as 15 cows;
 \therefore 1 sheep eats as much as $\frac{1}{2}\frac{5}{8}$ cow;
 \therefore 20 sheep eat as much as $\frac{1}{2}\frac{5}{8} \times 20 = 10\frac{1}{2}$ cows;
 33 cows and 20 sheep $= 33 \text{ cows} + 10\frac{1}{2} \text{ cows} = 43\frac{1}{2}$ cows;
 15 cows graze in 11 days 5 ac.;
 \therefore 1 cow grazes in 1 day $\frac{5}{15 \times 11}$ or $\frac{1}{33}$ ac.;
 \therefore $43\frac{1}{2}$ cows graze in 1 day $\frac{1}{33} \times 43\frac{1}{2}$, or $\frac{17\frac{1}{2}}{11}$ ac.
 \therefore $43\frac{1}{2}$ cows graze 13 ac. in $18 \div \frac{17\frac{1}{2}}{11}$ days, or $\frac{18 \times 77}{103}$
 $= 13\frac{1}{7}$ days.
- (14) (1) A is to have half as much again as B , \therefore $\$94.50$ must be divided into 5 equal shares of which A is to have 3 and B 2; $\$94.50 \div 5 = \18.90 ; $\$18.90 \times 3 = \$56.70 = A$'s share; $\$18.90 \times 2 = \$37.80 = B$'s share.

(Continued on next page.)

(14 continued.)

(²) B is to have half A 's share or A is to have twice B 's; \therefore \$94.50 must be divided into 3 equal shares, of which A is to have 2 and B 1. $\$94.50 \div 3 = \31.50 ; $\$31.50 \times 2 = \$63.00 = A$'s share; $\$31.50 \times 1 = \$31.50 = B$'s share.

(15) Amount of debt = $\$500 + (\$250 \times 2) + (\$75 \times 3) = \1225 ; amount of property = $\$625$; \therefore he will pay $\$1225 \div \$625 = \$1\frac{5}{9}$ in the \$ and the first creditor will receive $\$500 \times \frac{5}{9} = \$255.10\frac{4}{9}$.

(16) \$750 would purchase $\frac{750}{10000} = \frac{3}{40}$ of the mine; \therefore $\frac{3}{40}$ of the man's share = $\frac{3}{40}$ of the whole mine; and his entire share = $(\frac{3}{40} \div \frac{3}{40})$ of the mine = $\frac{2}{5}$.

(17) The first and second div^{ns}. contain $\frac{1}{2} + \frac{1}{5} = \frac{7}{10}$ of the entire school, therefore the remaining, or $\frac{3}{10}$ must belong to the third divⁿ., which by the question contains 80. If $80 = \frac{3}{10}$, $\frac{1}{5} = \frac{1}{3}$ of $80 = 10$, and the whole, or $\frac{2}{5} = 25 \times 10 = 250$.

(18) A can do in 1 day $\frac{1}{10}$; B can do in 1 day $\frac{1}{12}$; therefore A and B together do in 1 day $\frac{1}{10} + \frac{1}{12} = \frac{11}{60}$; \therefore no of days in which A and B will together do the work = $\frac{\text{whole work}}{\text{part done in one day}} = \frac{1}{\frac{11}{60}} = 5\frac{5}{11}$ days.

(19) Eldest son rec'd $\frac{1}{2}$ of $\frac{3}{5}$ leaving $\frac{1}{2}$.
 Second son rec'd $\frac{1}{2}$ of $\frac{1}{2} = \frac{1}{2}$.
 Widow rec'd $1 - (\frac{1}{2} + \frac{1}{2}) = 0$.
 Also by the question $\frac{1}{2} - \frac{1}{2} = 0$ (the eldest son's share minus the second son's) = \$1690, or $\frac{1}{2} = \$1690$; \therefore whole property = $\frac{\$1690}{\frac{1}{2}} = \3380 .

Eldest son rec'd $\frac{1}{2}$ of \$3380 = \$1690.

Second son rec'd $\frac{1}{2}$ of 3380 = \$1690.

Widow rec'd $\frac{1}{2}$ of \$3380 = \$1690.

(20) Since C receives 9 ac. more than A and B ;
 \therefore 55 ac., 2 ro. — 9 ac. must be equally divided be-
 (Continued on next page.)

(20 continued.)

tween A , B , and C ; hence A 's and B 's share =
 $76 \text{ ac., } 2 \text{ ro.}$

$$\frac{2}{2} = 38 \text{ ac., } 1 \text{ ro.}$$

If A receives 1, B receives $\frac{6}{11}$, $\therefore A$'s and B 's = $1\frac{6}{11}$.

$\therefore A$'s = $(38 \text{ ac., } 1 \text{ ro.}) \times \frac{11}{7} = 24 \text{ ac., } 3 \text{ ro.,}$

B 's = $13 \text{ ac., } 2 \text{ ro., } C$'s = $47 \text{ ac. } 1 \text{ ro.}$

- (21) 3 boys (one out of each third) paid $(18+30+42) \text{ cts.}$
 $= 90 \text{ cts.}; \therefore$ the average payment made by each
 boy = $\frac{90}{3} \text{ cts.} = 30 \text{ cts.}; \therefore$ no. of boys = $\frac{1440}{30} = 48$.

- (22) First pipe fills $\frac{1}{6}$ of the cistern per minute; second
 and third pipes empty $\frac{1}{6} + \frac{1}{7} = \frac{13}{42}$ of the cistern per
 minute; \therefore part of cistern filled per minute = $\frac{1}{6} -$

$$\frac{13}{42} = \frac{1}{42}. \therefore \text{No. of minutes} = \frac{\text{cistern}}{\text{part filled a min.}} =$$

$$\frac{1}{\frac{1}{42}} = 42.$$

- (23) (1) A and B do in 1 day $\frac{1}{30}$ of the work.

B does in 1 day $\frac{1}{70}$ of the work.

$\therefore A$ does in 1 day $\frac{1}{30} - \frac{1}{70} = \frac{2}{105}$ of the work.

$\therefore A$ can do the whole in $\frac{1}{\frac{2}{105}} \text{ days} = 52\frac{1}{2} \text{ days.}$

(2) A does $\frac{2}{105} - \frac{1}{70} = \frac{1}{210}$ more than B in 1 day.

$\therefore A$ does $\frac{1}{210} \times 30 = \frac{1}{7}$ more than B in 30 days.

- (24) A and B do $\frac{3}{20}$ of the work in 1 day.

A and C do $\frac{2}{11}$ of the work in 1 day.

$\therefore 2 A, B,$ and C do $\frac{3}{20} + \frac{2}{11} = \frac{73}{220}$ of the work in 1
 day.

But $A, B,$ and C do $\frac{4}{15}$ of the work in 1 day;

$\therefore A$ does $\frac{73}{220} - \frac{4}{15} = \frac{43}{660}$ of the work in 1 day;

\therefore no. of days required by $A = \frac{\text{whole work}}{\text{part done in 1 day}}$

$$= \frac{1}{\frac{43}{660}} = 15\frac{15}{43}.$$

- (25) $\frac{4}{7}$ remains in 1st.; $\therefore \frac{3}{7}$ is put into 2nd.; 3^d. holds $\frac{3}{7} -$
 $(\frac{1}{2} \text{ of } \frac{3}{7}) = \frac{3}{14}$; and fills $\frac{6}{14}$ of 4th. cask, which con-
 (Continued on next page.)

(25 continued.)

sequently holds $\frac{9}{28} \div \frac{9}{16} = \frac{4}{7}$; \therefore 3^d. and 4th. together hold $\frac{9}{28} + \frac{4}{7} = \frac{13}{7}$ leaving when taken from first cask $\frac{2}{7}$, which by the question is equivalent to 15 gallons;

\therefore 1st. cask holds $\frac{15}{\frac{2}{7}} = 140$ gallons,

2nd. cask holds $\frac{2}{7}$ of 140 = 60 gallons,

3rd. cask holds $\frac{9}{28}$ of 140 = 45 gallons,

4th. cask holds $\frac{4}{7}$ of 140 = 80 gallons.

- (26) While A does $\frac{1}{2}$ the work B does $\frac{1}{3}$;
 \therefore while A does the whole work B does $\frac{2}{3}$;
 \therefore while A does the whole work A and B do $\frac{5}{3}$.
 But A and B do the work in 12 days; $\therefore A$ requires $\frac{5}{3}$ of 12 days = 20 days to complete the work alone.

EX. LIII. (p. 95.)

$$(1) \cdot 3 = \frac{3}{100}; \cdot 13 = \frac{13}{100}; \cdot 19 = \frac{19}{100}; \cdot 301 = \frac{301}{1000}; \cdot 270 = \frac{270}{1000}; 5653 = \frac{5653}{10000}.$$

$$(2) \cdot 504 = \frac{504}{1000}; \cdot 73201 = \frac{73201}{100000}; \cdot 791003 = \frac{791003}{1000000}; \cdot 03 = \frac{3}{100}; \cdot 0045 = \frac{45}{10000}.$$

$$(3) \cdot 300 = \frac{300}{1000}; 18.741 = 18\frac{741}{1000} = \frac{18741}{1000}; 2.1 = 2\frac{1}{10} = \frac{21}{10}; \cdot 000001 = \frac{1}{1000000}; 5.0007 = 5\frac{7}{10000} = \frac{50007}{10000}.$$

$$(4) 347.02007 = 347\frac{2007}{100000} = \frac{34702007}{100000}; 500.005 = 500\frac{5}{1000} = \frac{500005}{1000}; 5.60746805 = 5\frac{60746805}{100000000}; \cdot 0000500 = \frac{500}{100000000}.$$

$$(5) 29.0050 = 29\frac{50}{10000} = \frac{290050}{10000}; 20.607 = 20\frac{607}{1000} = \frac{20607}{1000}; 5.00038 = 5\frac{38}{100000} = \frac{500038}{100000}.$$

EX. LIV. (p. 96.)

$$(1) \frac{4}{10} = \cdot 4; \frac{23}{10} = 2.3; \frac{235}{10} = 23.5; \frac{4}{100} = \cdot 04; \frac{447}{1000} = \cdot 447; \frac{47}{1000} = \cdot 047.$$

$$(2) \frac{5001}{1000} = 500.1; \frac{551}{100000} = \cdot 00551; \frac{502}{100} = 5.02; \frac{502}{100000} = \cdot 00502.$$

(3) $\frac{35600}{1000} = 35.6$; $\frac{1700701}{100000} = 17.00701$; $\frac{50005}{10000000} = .0050005$; $\frac{2000000}{100000000} = .0000002$; $\frac{2076854}{1000000} = 20.76854$; $\frac{53052}{1000000000} = .0000053052$.

(4) Seven tenths = .7; thirty thousandths = .030.

(5) Three hundred and three thousandths = 300.003; one ten thousandth = .0001.

(6) Four, and five hundred and four millionths = 4.000504; seventy ten millionths = .0000070.

(7) .6 = six tenths; .17 = seventeen hundredths; .07 = seven hundredths.

(8) .007 = seven thousandths; .700 = seven hundred thousandths or seven tenths; 6.3004 = six and three thousand and four ten thousandths.

(9) 35.00205 = thirty-five and two hundred and five hundred thousandths; 400.34000 = four hundred, and thirty-four thousand one hundred thousandths, or four hundred and thirty-four hundredths.

(10) $.3 \times 10 = 3$; $.3 \times 100 = 30$; $.3 \times 10000 = 3000$; $.3 \times 1000000 = 300000$; $.13 \times 10 = 1.3$; $.13 \times 100 = 13$; $.13 \times 10000 = 1300$; $.13 \times 1000000 = 130000$; $.013 \times 10 = .13$; $.013 \times 100 = 1.3$; $.013 \times 10000 = 130$; $.013 \times 1000000 = 13000$; $54.0003 \times 10 = 540.003$; $54.0003 \times 100 = 5400.03$; $54.0003 \times 10000 = 540003$; $54.0003 \times 1000000 = 54003000$; $7420.1 \times 10 = 74201$; $7420.1 \times 100 = 742010$; $7420.1 \times 10000 = 74201000$; $7420.1 \times 1000000 = 7420100000$.

(11) $\frac{5.362}{10} = .5362$; $\frac{5.362}{100} = .05362$; $\frac{5.362}{1000000} =$

$.000005362$; $\frac{.3}{10} = .03$; $\frac{.3}{100} = .003$; $\frac{.3}{1000000} =$

(Continued on next page.)

(11 continued.)

$$\cdot 0000003; \frac{70\cdot 0107}{10} = 7\cdot 00107 \cdot \frac{70\cdot 0107}{100} = 700107;$$

$$\frac{70\cdot 0107}{1000000} = \cdot 0000700107; \frac{5000}{10} = 500; \frac{5000}{100} = 50;$$

$$\frac{5000}{1000000} = \cdot 005.$$

$$(12) \frac{2\cdot 03}{1000000} = \cdot 00000203.$$

Ex. LV. (p. 97.)

$$\begin{array}{r} (1) \\ 1\cdot 035 \\ \cdot 00643 \\ 27\cdot \\ 2\cdot 2146 \\ 530\cdot 69 \\ \hline 560\cdot 34603 \end{array}$$

$$\begin{array}{r} (2) \\ 24\cdot \\ 185\cdot 3039 \\ \cdot 98795 \\ 3\cdot 098 \\ \cdot 70003 \\ \hline 214\cdot 08691 \end{array}$$

$$\begin{array}{r} (3) \\ 186\cdot 8 \\ 35\cdot 2779 \\ 9000\cdot \\ 9\cdot 201 \\ 830\cdot 05764 \\ \hline 10061\cdot 33654 \end{array}$$

$$\begin{array}{r} (4) \\ 94\cdot 25 \\ \cdot 008 \\ 187\cdot 96099 \\ 57\cdot 3916 \\ 5\cdot 998347 \\ \hline 345\cdot 608037 \end{array}$$

$$\begin{array}{r} (5) \\ 12\cdot 5 \\ 20\cdot 043 \\ 7\cdot 63201 \\ \cdot 0561 \\ \hline 40\cdot 23111 \end{array}$$

$$\begin{array}{l} \text{Again } 12\cdot 5 = 12\frac{5}{10} = 12\frac{1}{2} \\ 20\cdot 043 = 20\frac{43}{1000} \\ 7\cdot 63201 = 7\frac{63201}{100000} \\ \cdot 0561 = \frac{561}{10000} \end{array}$$

$$12\frac{1}{2} + 20\frac{43}{1000} + 7\frac{63201}{100000} + \frac{561}{10000} = 39 +$$

$$\frac{50000 + 4300 + 63201 + 5610}{100000} = 39 + \frac{123111}{100000} = 40\frac{23111}{100000}$$

$$= 40\cdot 23111.$$

(6)

$$\begin{array}{r} .0573 \\ 15 \cdot \\ 2 \cdot 04 \\ 567 \cdot 98075 \\ \hline \end{array}$$

$$585 \cdot 07805$$

$$\frac{573}{10000} + 15 + 2 \frac{4}{100} + 567 \frac{98075}{100000} = 584 + \frac{5730 + 4000 + 98075}{100000} = 584 \frac{107805}{100000} = 585 \frac{7805}{100000} = 585 \cdot 07805$$

$$.0573 = \frac{573}{100000}$$

$$2 \cdot 04 = 2 \frac{4}{100}$$

$$567 \cdot 98075 = 567 \frac{98075}{100000}$$

(7)

$$\begin{array}{r} 505 \cdot 0003 \\ 13 \cdot 98 \\ 5853 \cdot 097 \\ 960 \cdot \\ \hline \end{array}$$

$$7332 \cdot 0773$$

$$505 \frac{3}{10000} + 13 \frac{98}{100} + 5853 \frac{97}{1000} + 960 =$$

$$7331 + \frac{3 + 9800 + 970}{10000} = 7331 \frac{10773}{10000} = 7332 \frac{773}{10000}$$

$$= 7332 \cdot 0773.$$

$$505 \cdot 0003 = 505 \frac{3}{100000}$$

$$13 \cdot 98 = 13 \frac{98}{100}$$

$$5853 \cdot 097 = 5853 \frac{97}{1000}$$

(8)

$$\begin{array}{r} 6 \cdot 00734 \\ 54 \cdot \\ 15 \cdot 70087012 \\ 8 \cdot 00003 \\ 9 \cdot 987789 \\ \hline \end{array}$$

$$93 \cdot 69602912$$

$$6 \frac{734}{100000} + 54 + 15 \frac{70087012}{10000000} + 8 \frac{3}{100000} + 9 \frac{987789}{1000000} =$$

$$92 + \frac{734000 + 70087012 + 3000 + 98778900}{100000000} = 92 \frac{169602912}{100000000}$$

$$= 93 \frac{69602912}{100000000} = 93 \cdot 69602912.$$

$$6 \cdot 00734 = 6 \frac{734}{1000000}$$

$$15 \cdot 70087012 = 15 \frac{70087012}{100000000}$$

$$8 \cdot 00003 = 8 \frac{3}{1000000}$$

$$9 \cdot 987789 = 9 \frac{987789}{1000000}$$

(9)

$$\begin{array}{r} \cdot 13 \\ 7\cdot0003 \\ 408\cdot5 \\ 978\cdot \\ \cdot 0808 \\ \hline \end{array}$$

$$\begin{array}{r} \cdot 13 = \frac{13}{100} \\ 7\cdot0003 = 7\frac{3}{10000} \\ 408\cdot5 = 408\frac{5}{10} \\ \cdot 0808 = \frac{808}{10000} \end{array}$$

$$1393\cdot7111$$

$$\frac{13}{100} + 7\frac{3}{10000} + 408\frac{5}{10} + \frac{808}{10000} + 978 = 1393 + \frac{1300 + 3 + 5000 + 808}{10000} = 1393\frac{7111}{10000} = 1393\cdot7111.$$

Ex. LVI. (p. 98.)

$$\begin{array}{r} (1) \\ 5\cdot345 \\ 3\cdot087 \\ \hline 2\cdot258 \end{array}$$

$$\begin{array}{r} (2) \\ 26\cdot002 \\ 18\cdot9564 \\ \hline 7\cdot0456 \end{array}$$

$$\begin{array}{r} (3) \\ 15\cdot67 \\ 9\cdot7003 \\ \hline 5\cdot9697 \end{array}$$

$$\begin{array}{r} (4) \\ 21\cdot \\ 19\cdot9009 \\ \hline 1\cdot0091 \end{array}$$

(5)

$$\begin{array}{r} (1) \quad 1\cdot3 \quad 1\cdot3 = 1\frac{3}{10} \\ \cdot 13 \quad \cdot 13 = \frac{13}{100} \end{array}$$

$$\begin{array}{r} 207\cdot \\ 2\cdot07 = 2\frac{7}{100} \end{array}$$

$$\begin{array}{r} 1\cdot17 \\ 1\frac{3}{10} - \frac{10}{100} = 1\frac{17}{100} = 1\cdot17; \quad 207 - 2\frac{7}{100} = 204\frac{93}{100} = 204\cdot93. \end{array}$$

$$\begin{array}{r} (2) \quad 76\cdot3 \quad 76\cdot3 = 76\frac{3}{10} \quad 67\cdot5803 \quad 67\cdot5803 = 67\frac{5803}{10000} \\ 7\cdot63 \quad 7\cdot63 = 7\frac{63}{100} \quad 67\cdot3 \quad 67\cdot3 = 67\frac{3}{10} \end{array}$$

$$\begin{array}{r} 68\cdot67 \quad 2803 \\ 76\frac{3}{10} - 7\frac{63}{100} = 68\frac{67}{100} = 68\cdot67; \quad 67\frac{5803}{10000} - 67\frac{3}{10} = \frac{2803}{10000} = 2803; \end{array}$$

$$\begin{array}{r} (3) \quad 571\cdot \\ 428\cdot90456 \end{array} \quad 428\cdot90456 = 428\frac{90456}{100000}$$

$$\begin{array}{r} 72\cdot09544 \\ 501 - 428\frac{90456}{100000} = 72\frac{9544}{100000} = 72\cdot09544; \end{array}$$

(Continued on next page.)

(5 Continued.)

$$\begin{array}{r}
 5324 \\
 \underline{53\cdot24} \\
 5270\cdot76 \\
 \text{(1) } 4\cdot42 \\
 \quad \cdot00043 \\
 \hline
 4\cdot41958 \\
 \cdot007 \\
 \cdot0000007 \\
 \hline
 \cdot0069993
 \end{array}
 \qquad
 \begin{array}{l}
 53\cdot24 = 53\frac{24}{100} \\
 5324 - 53\frac{24}{100} = 5270\frac{76}{100} = 5270\cdot76; \\
 4\cdot42 = 4\frac{42}{100} \\
 \cdot00042 = \frac{42}{100000} \\
 4\frac{42}{100} - \frac{42}{100000} = 4\frac{41958}{100000} = 4\cdot41958 \\
 \cdot007 = \frac{7}{1000} \\
 \cdot0000007 = \frac{7}{10000000} \\
 \frac{7}{1000} - \frac{7}{10000000} = \frac{69993}{10000000} = \cdot0069993.
 \end{array}$$

$$\begin{array}{r}
 \text{(1) } 2\cdot3 \\
 \quad \cdot23 \\
 \hline
 2\cdot07
 \end{array}
 \qquad
 \begin{array}{r}
 \text{(6) } 23\cdot \\
 \quad 2\cdot07 \\
 \hline
 20\cdot93
 \end{array}
 \qquad
 \begin{array}{r}
 \text{(1) } \cdot1 \\
 \quad \cdot005 \\
 \hline
 \cdot095
 \end{array}
 \qquad
 \begin{array}{r}
 \text{(7) } 20\cdot009 \\
 \quad \cdot029 \\
 \hline
 19\cdot980
 \end{array}$$

$$\begin{array}{r}
 \cdot7 \\
 \cdot037 \\
 \hline
 \cdot613
 \end{array}
 \qquad
 \begin{array}{r}
 \text{(8) } 1\cdot2 \\
 \quad \cdot12 \\
 \quad \cdot012 \\
 \hline
 210\cdot \\
 \hline
 211\cdot332
 \end{array}
 \qquad
 \begin{array}{r}
 \text{(9) } \cdot332 = \frac{332}{1000}, \quad 1 - \frac{332}{1000} = \\
 \frac{668}{1000} = \frac{167}{250}.
 \end{array}$$

$$\begin{array}{r}
 \text{(1) } 31\cdot25 \\
 \quad 3\cdot059 \\
 \hline
 28\cdot191 \\
 235\cdot6758 \\
 \hline
 263\cdot8668 \\
 184\cdot0003 \\
 \hline
 79\cdot8665
 \end{array}
 \qquad
 \begin{array}{r}
 \text{(2) } 215\cdot263 \\
 \quad 6\cdot9504 \\
 \hline
 208\cdot3126 \\
 125\cdot3807 \\
 \hline
 82\cdot9319
 \end{array}
 \qquad
 \begin{array}{r}
 7\cdot0004 \\
 \quad \cdot05 \\
 \hline
 6\cdot9504
 \end{array}
 \qquad
 \begin{array}{r}
 45\cdot08\frac{1}{2} \\
 80\cdot3007 \\
 \hline
 125\cdot3807
 \end{array}$$

EX. LVII. (p. 98.)

$$\begin{array}{r} (1) \\ 3.25 \\ .35 \\ \hline \end{array}$$

$$\begin{array}{r} 1625 \\ 975 \\ \hline \end{array}$$

$$1.1375$$

$$\begin{array}{r} (2) \\ 6.035 \\ 2.7 \\ \hline \end{array}$$

$$\begin{array}{r} 42245 \\ 12070 \\ \hline \end{array}$$

$$16.2945$$

$$\begin{array}{r} (3) \\ 40.004 \\ 2.03 \\ \hline \end{array}$$

$$\begin{array}{r} 120012 \\ 80008 \\ \hline \end{array}$$

$$81.20812$$

$$\begin{array}{r} (4) \\ 680.35 \\ .0049 \\ \hline \end{array}$$

$$\begin{array}{r} 612315 \\ 272140 \\ \hline \end{array}$$

$$3.333715$$

(5)

$$\begin{array}{r} 20607 \\ .20607 \\ \hline \end{array}$$

$$\begin{array}{r} 144249 \\ 123642 \\ 41214 \\ \hline \end{array}$$

$$4246.48449$$

$$\begin{array}{r} 57.068 \\ 2.004 \\ \hline \end{array}$$

$$\begin{array}{r} 228272 \\ 114136 \\ \hline \end{array}$$

$$114.364272,$$

$$5.36$$

$$700$$

$$3752.00,$$

$$7.01509$$

$$50.805$$

$$3507545$$

$$5612072$$

$$3507545$$

$$356.40164745$$

(6)

$$\begin{array}{r} 60.70 \\ 11 \\ \hline \end{array}$$

$$667.81,$$

$$\frac{60.71}{100} \times 11 = \frac{667.81}{100} = 6.6781;$$

$$60.71 = 60.710$$

$$57.068 \times 2.004 = \frac{57068}{1000} \times \frac{2004}{1000} = \frac{114369472}{1000000} = 114.364272;$$

$$5.36 \times 700 = \frac{536}{100} \times \frac{700}{1} = 3752;$$

$$7.01509 \times 50.805 = \frac{701509}{100000} \times \frac{50805}{1000} = \frac{35540164745}{100000000} = 356.40164745.$$

48·067
·00037

336469
144201

·01778479,

54·3047
9·00005

2715235
4887423

488·745015235,

2·568
·00025

12840
5136

·00064200 = ·000642

(8)

(1) 5·5
·055

275
275

·3025
550

151250
15125

166·3750
·0055

831875
831875

·9150625,

(7)

$$48·067 \times ·00037 = \frac{48067}{1000} \times \frac{37}{100000} = \frac{1778479}{100000000} = ·01778479;$$

$$54·3047 \times 9·00005 = \frac{543047}{10000} \times \frac{900005}{1000000} = \frac{488745015235}{1000000000} = 488·745015235;$$

$$2·568 \times ·00025 = \frac{2568}{1000} \times \frac{25}{100000} = \frac{64200}{100000000} = ·000642.$$

$$5·5 \times ·055 \times 550 \times ·0055 = \frac{55}{10} \times \frac{55}{1000} \times \frac{550}{1} \times \frac{55}{1000} = \frac{9150625}{100000000} = ·9150625;$$

(Continued on next page.)

(8 continued.)

(2) 1.75

6.2

350

1050

10.850

85

5425

8680

922.25

.0004

$$\cdot 368900 = \cdot 3689.$$

$$1.75 \times 6.2 \times 85 \times .0004 = \frac{1.75}{100} \times \frac{6.2}{10} \times \frac{85}{1} \times \frac{4}{10000} \\ = \frac{3689}{10000} = \cdot 3689.$$

(9)

37.85

7.35

18925

11355

26495

278.1975 yds.

(10)

365

.95

1825

3285

 $346.75 =$
 $346\frac{3}{4}$ loaves.

Ex. LVIII. (p. 100.)

(1)

2.7) 33.372 (12.36

27

63

54

97

81

162

162

$$33.372 \div 2.7 = \frac{33372}{10000} \times \frac{10}{27} = \frac{1236}{100} = 12.36.$$

.27) .33372 (1.236

(2)

$$\cdot 33372 \div \cdot 27 = \frac{33372}{100000} \times \frac{100}{27} =$$

$$\frac{1236}{10000} = 1.236.$$

27) .33372 (.01236

(3)

$$\cdot 33372 \div \cdot 27 = \frac{33372}{1000000} \times \frac{100}{27} =$$

$$\frac{1236}{100000} = \cdot 01236.$$

.27) 33372.00 (123600

(4)

$$33372 \div \cdot 27 = \frac{33372}{27} \times \frac{100}{1} =$$

$$\frac{123600}{1} = 123600.$$

$$\begin{aligned} & \text{(10 continued.)} \\ & \cdot 00325) 552 \cdot 53250 \text{ (170010, } 552 \cdot 5325 \div \cdot 00325 = \\ & \quad \frac{5525325}{10000} \times \frac{100000}{325} = 170010. \end{aligned}$$

(11)

$$464 \cdot 3) 2 \cdot 419003 \text{ (} \cdot 00521$$

23215

9750

9286

4643

4643

$$2 \cdot 419003 \div 464 \cdot 3 = \frac{2419003}{1000000} \times \frac{10}{4643} =$$

$$\frac{100000}{1000000} = \cdot 00521;$$

$$\cdot 004643) 2 \cdot 419003 \text{ (521}$$

$$2 \cdot 419003 \div \cdot 004643 = \frac{2419003}{1000000} \times \frac{1000000}{4643} = 521.$$

(12)

$$2 \cdot 7) \cdot 000081 \text{ (} \cdot 00003$$

81

$$\cdot 000081 \div 2 \cdot 7 = \frac{81}{1000000} \times \frac{10}{27} =$$

$$\frac{3}{1000000} = \cdot 00003;$$

$$\cdot 0027) \cdot 000081 \text{ (} \cdot 03$$

$$\cdot 00081 \div \cdot 0027 = \frac{81}{1000000} \times \frac{100000}{27} =$$

$$\frac{3}{100000} = \cdot 03;$$

$$27000) \cdot 000081 \text{ (} \cdot 000000003, \cdot 000081 \div 27000 = \frac{81}{1000000000}$$

$$\frac{1}{27000} = \frac{3}{10000000000} = \cdot 000000003.$$

(13)

$$2 \cdot 00099) 218051 \cdot 081884 \text{ (108971} \cdot 6$$

200099

1795208

1600792

1944161

1800191

1432708

1400693

$$218051 \cdot 081884 \div 2 \cdot 00099 =$$

$$\frac{218051081884}{100000000} \times \frac{1000000}{200099} =$$

$$\frac{1089716}{10} = 108971 \cdot 6;$$

320158

200099

1200594

1200594

$$200099) 218051 \cdot 081884 \text{ (108971} \cdot 6$$

$$218051 \cdot 081884 \div 200099 =$$

$$\frac{218051081884}{100000000} \times \frac{1}{200099} =$$

$$\frac{1089716}{1000000} = 1 \cdot 089716.$$

(14)

$$11) \begin{array}{r} .121 \text{ (.011} \\ \underline{121} \end{array} \quad .121 \div 11 = \frac{121}{1000} \times \frac{1}{11} = .011;$$

$$1100) .12100 \text{ (.00011} \quad .121 \div 1100 = \frac{121}{10000} \times \frac{1}{1100} = \frac{11}{1000000} = .00011;$$

$$.0011) .1210000 \text{ (110} \quad .121 \div .0011 = \frac{121}{10000} \times \frac{10000}{11} = 110.$$

(15)

$$.000193) 393.720000 \text{ (2040000}$$

386

772

772

$$393.72 \div .000193 = \frac{39372}{100} \times \frac{1000000}{193} = 2040000;$$

$$1.93) 393.72 \text{ (204} \\ \underline{393.72}$$

$$393.72 \div 1.93 = \frac{39372}{100} \times \frac{100}{193} = 204;$$

$$193000) 393.72000 \text{ (.00204} \\ \underline{39372000}$$

$$393.72 \div 193000 = \frac{39372}{100} \times \frac{1}{193000} = \frac{39372}{19300000} = .00204.$$

(16)

$$.03275) 590.48250 \text{ (18030}$$

3275

26298

26200

$$590.4825 \div .03275 = \frac{5904825}{100000} \times \frac{100000}{3275} = 18030;$$

9825

9825

$$327500) 590.4825000 \text{ (.0018030}$$

$$590.4825 \div 327500 =$$

$$\frac{5904825}{100000} \times \frac{1}{327500} = \frac{1803}{1000000} = .001803.$$

(17)

$$1\cdot00103) 213\cdot419596 \text{ (213}\cdot 2 \\ 200206$$

$$\begin{array}{r} 132135 \\ 100103 \\ \hline \end{array}$$

$$\begin{array}{r} 320329 \\ 300309 \\ \hline \end{array}$$

$$\begin{array}{r} 200206 \\ 200206 \\ \hline \end{array}$$

$$213\cdot419596 \div 1\cdot00103 = \frac{213419596}{100103} = 213\cdot2;$$

$$100103) 213\cdot419596 \text{ (}\cdot 002132 \quad 213\cdot419596 \div 100103 = \\ \frac{213419596}{100103} \times \frac{1000000}{1000000} = \frac{213419596}{100103} = \cdot 002132.$$

$$\begin{array}{r} (18) \\ \cdot 0024 \\ \cdot 24 \\ \hline \end{array}$$

$$24) \cdot 2424 \text{ (}\cdot 0101 \\ 24$$

$$\begin{array}{r} 24 \\ 24 \\ \hline \end{array}$$

$$\begin{array}{r} (19) \\ \cdot 25) \cdot 000200 \text{ (}\cdot 0008 \\ 200 \\ \hline \end{array}$$

$$\begin{array}{r} (20) \\ 1\cdot 75) 21\cdot 875 \text{ (12}\cdot 5 \text{ days,} \\ 175 \quad \text{or } 12\frac{1}{2} \text{ days.} \\ \hline \end{array}$$

$$\begin{array}{r} 437 \\ 350 \\ \hline \end{array}$$

$$\begin{array}{r} 875 \\ 875 \\ \hline \end{array}$$

$$\begin{array}{r} (21) \\ \cdot 75) 64\cdot 125 \text{ (85}\cdot 5 \text{ times,} \\ 600 \quad \text{or } 85\frac{1}{2} \text{ times.} \\ \hline \end{array}$$

$$\begin{array}{r} 412 \\ 375 \\ \hline \end{array}$$

$$\begin{array}{r} 375 \\ 375 \\ \hline \end{array}$$

$$\begin{array}{r} (22) \\ \cdot 023) \cdot 00070242 \text{ (}\cdot 03054 \\ 69 \\ \hline \end{array}$$

$$\begin{array}{r} 124 \\ 115 \\ \hline \end{array}$$

$$\begin{array}{r} 92 \\ 92 \\ \hline \end{array}$$

Ex. LIX. (p. 101.)

(1)

$$\begin{array}{r}
 3) 1.9000 (6.333 \\
 \underline{18} \\
 10 \\
 9 \\
 \underline{} \\
 10
 \end{array}
 \quad
 1.9 \div .3 = \frac{1.9}{1} \times \frac{10}{3} = \frac{19}{3} \times \frac{10}{10} = \frac{1900}{3} \times \frac{1}{1000} = \frac{6333}{1000} = 6.333;$$

$$\begin{array}{l}
 .03) 1.90000 (63.333 \quad 1.9 \div .03 = \frac{1.9}{1} \times \frac{100}{3} = \frac{19}{1} \times \frac{100}{3} = \frac{1900}{3} \times \frac{1}{10} = \frac{190000}{3} \times \frac{1}{10000} = \frac{63333}{10000} = 63.333; \\
 300) 1.900 (.00633 \quad 1.9 \div 300 = \frac{1.9}{1} \times \frac{1}{300} = \frac{19}{100} \times \frac{1}{10} = \frac{19000}{10000} \times \frac{1}{10000} = \frac{6333}{100000} = .00633, \text{ or } .006.
 \end{array}$$

(2)

$$\begin{array}{r}
 159) 4.937 (.031 \\
 \underline{577} \\
 167 \\
 159
 \end{array}
 \quad
 4.936 \div 159 = \frac{4936}{1000} \times \frac{1}{159} = \frac{4936}{159000} \times \frac{1000}{1000} = \frac{31}{1000} = .031;$$

$$\begin{array}{r}
 1.59) 4.93700 (3.105 \\
 \underline{477} \\
 167 \\
 159 \\
 \underline{} \\
 800 \\
 795
 \end{array}
 \quad
 4.937 \div 1.59 = \frac{4937}{1000} \times \frac{100}{159} = \frac{4937}{15900} \times \frac{1000}{1000} = \frac{3105}{1000} = 3.105;$$

$$1590) 4.937 (.003 \quad 4.937 \div 1590 = \frac{4937}{10000} \times \frac{1}{1590} = \frac{4937}{1590000} \times \frac{1000}{1000} = \frac{3}{1000} = .003.$$

(3)

$$53) 329744 \cdot 000 \quad (6221 \cdot 584$$

318

$$\begin{array}{r} 117 \\ 106 \\ \hline \end{array}$$

$$\begin{array}{r} 114 \\ 106 \\ \hline \end{array}$$

$$\begin{array}{r} 84 \\ 53 \\ \hline \end{array}$$

$$\begin{array}{r} 310 \end{array}$$

$$3 \cdot 29744 \div 53 = \frac{329744000}{53000} = \frac{6221584000}{10000} = 6221 \cdot 584;$$

$$\begin{array}{r} 310 \\ 265 \\ \hline \end{array}$$

$$\begin{array}{r} 450 \\ 424 \\ \hline \end{array}$$

$$\begin{array}{r} 260 \\ 212 \end{array}$$

$$\cdot 0053) 329744 \cdot 0000000 \quad (62215849 \cdot 056.$$

$$329744 \div \cdot 0053 = 3297440000000 \times \frac{1}{53000} = \frac{62215840000}{10000} = 62215849 \cdot 056;$$

$$5300) 329744 \quad (62 \cdot 215, \quad 329744 \div 5300 = \frac{3297440}{53000} \times \frac{1}{1000} = \frac{62215}{10000} = 62 \cdot 215.$$

EX. LX. (p. 102.)

(1)

$$\frac{4|1 \cdot 00}{\cdot 25}; \frac{5|3 \cdot 0}{\cdot 6}; \frac{4|6 \cdot 0}{1 \cdot 5}; \frac{5|1 \cdot 0}{\cdot 2} \quad \therefore \text{Ans.} = 6 \cdot 2; \quad \frac{5|39 \cdot 0}{7 \cdot 8}$$

$$\frac{8|5 \cdot 000}{\cdot 625}; \frac{10|3 \cdot 0}{\cdot 3} \quad \therefore \text{Ans.} = 5 \cdot 3.$$

(2)

$$16 \left\{ \begin{array}{l} 4 \\ 4 \end{array} \left| \begin{array}{l} 3 \cdot 00 \\ \hline \cdot 7500; \\ \cdot 1875 \end{array} \right. \right. \quad 16 \left\{ \begin{array}{l} 4 \\ 4 \end{array} \left| \begin{array}{l} 15 \cdot 00 \\ \hline 3 \cdot 7500; \\ \cdot 9375 \end{array} \right. \right. \quad \therefore \text{Ans.} = 8 \cdot 9375;$$

$$20 \left\{ \begin{array}{l} 5 \\ 4 \end{array} \left| \begin{array}{l} 19 \cdot 0 \\ \hline 3 \cdot 80; \\ \cdot 95 \end{array} \right. \right. \quad 32 \left\{ \begin{array}{l} 4 \\ 8 \end{array} \left| \begin{array}{l} 21 \cdot 00 \\ \hline 7 \cdot 75000; \\ \cdot 96875 \end{array} \right. \right. \quad 40 \left\{ \begin{array}{l} 8 \\ 5 \end{array} \left| \begin{array}{l} 37 \cdot 000 \\ \hline 4 \cdot 625 \\ \cdot 925 \end{array} \right. \right.$$

$$\therefore \text{Ans.} = 7 \cdot 925.$$

(3)

$$50 \left\{ \begin{array}{l} 5 \mid 47.0 \\ 10 \mid \underline{9.40} \\ \cdot 94 \end{array} \right.$$

$$125 \left\{ \begin{array}{l} 5 \mid 7.0 \\ 5 \mid \underline{1.40} \\ 5 \mid \underline{\cdot 280} \\ \cdot 056 \end{array} \right.$$

$$\therefore \text{Ans.} = 4.056;$$

$$500 \left\{ \begin{array}{l} 10 \mid 3.0 \\ 10 \mid \underline{\cdot 30} \\ 5 \mid \underline{\cdot 030} \\ \cdot 006; \end{array} \right.$$

$$625 \left\{ \begin{array}{l} 5 \mid 99.00 \\ 5 \mid \underline{19.80} \\ 5 \mid \underline{3.960} \\ 5 \mid \underline{\cdot 7920} \\ \cdot 1584; \end{array} \right.$$

$$1024 \left\{ \begin{array}{l} 8 \mid 3.000 \\ 8 \mid \underline{\cdot 375000} \\ 8 \mid \underline{\cdot 046875000} \\ 2 \mid \underline{\cdot 0058593750} \\ \cdot 0029296875 \end{array} \right.$$

$$\therefore \text{Ans.} = 84.0029296875.$$

(4)

$$\frac{5}{8} \text{ of } 1\frac{3}{6} = 1\frac{6.5}{28},$$

$$128 \left\{ \begin{array}{l} 4 \mid 65.00 \\ 4 \mid \underline{16.2500} \\ 8 \mid \underline{4.0625000} \\ \cdot 5078125; \end{array} \right.$$

$$3\frac{1}{8} \text{ of } 2\frac{1}{5} = 8\frac{3}{4},$$

$$4 \overline{) 3.00} \quad \therefore \text{Ans.} = 8.75;$$

$$\cdot 75$$

$$3\frac{1}{2} \text{ of } 4\frac{1}{4} \text{ of } 5\frac{1}{3} = 76\frac{1.5}{64}, \quad 64 \left\{ \begin{array}{l} 8 \mid 15.000 \\ 8 \mid \underline{1.875000} \\ \cdot 234375 \end{array} \right. \quad \therefore \text{Ans.} = 76.234375.$$

(5)

$$1\frac{3}{8} - 1\frac{3}{16} + 3\frac{5}{40},$$

$$5 \overline{) 3.0} \quad \therefore 1\frac{3}{8} = 1.6;$$

$$\cdot 6$$

$$1.6 - .8125 = .7875$$

$$.7875 + 3.125 = 3.9125,$$

$$16 \left\{ \begin{array}{l} 4 \mid 13.0 \\ 4 \mid \underline{3.25} \\ \cdot 8125 \end{array} \right. \quad \therefore 1\frac{3}{8} = .8125;$$

(Continued on next page.)

(5 continued.)

$$40 \left\{ \begin{array}{l} 5 \\ 8 \end{array} \right| \begin{array}{l} 5 \\ 1.000 \\ \hline .125 \end{array} \quad \therefore 3\frac{5}{40} = 3.125;$$

$$11\frac{1}{2} + .75 \text{ of } \frac{2}{5} \text{ of } 6\frac{3}{4} = 11.5 + .75 \text{ of } \frac{12.25}{5} = 11.5 + .75 \times 6\frac{1}{2} = 11.5 + .75 \times 6.48 = 11.5 + 4.86 = 16.36.$$

EX. LXI. (p. 104.)

$$(1) \quad 3\overline{)2.0}; \quad 9\overline{)1.0}; \quad 7\overline{)6.0}; \quad 12\overline{)7.0}; \quad 15 \left\{ \begin{array}{l} 5 \\ 3 \end{array} \right| \begin{array}{l} 11.0 \\ 2.2 \\ \hline .73. \end{array}$$

$$(2) \quad 81 \left\{ \begin{array}{l} 9 \\ 9 \end{array} \right| \begin{array}{l} 3 \\ 33333 \\ \hline .037 \end{array} \quad \therefore \text{Ans.} = 6.037; \quad 37 \overline{)5.0} (.135)$$

$$44 \left\{ \begin{array}{l} 4 \\ 11 \end{array} \right| \begin{array}{l} 7.60 \\ 1.75 \\ \hline .159 \end{array} \quad \therefore \text{Ans.} = 160.1590; \quad \begin{array}{r} 130 \\ 111 \\ \hline 190 \\ 185 \\ \hline 50 \end{array} \quad \therefore \text{Ans.} = 7.135;$$

$$17) 15.0 (.8823529411764705)$$

$$\therefore \text{Ans.} = 2.8823529411764705.$$

$$\begin{array}{r} 140 \\ 136 \\ \hline \end{array}$$

$$\begin{array}{r} 50 \\ 34 \\ \hline \end{array}$$

$$\begin{array}{r} 30 \\ 17 \\ \hline \end{array}$$

$$\begin{array}{r} 120 \\ 119 \\ \hline \end{array}$$

$$\begin{array}{r} 40 \\ 34 \\ \hline \end{array}$$

$$\begin{array}{r} 160 \\ 153 \\ \hline \end{array}$$

$$\begin{array}{r} 130 \\ 119 \\ \hline \end{array}$$

$$\begin{array}{r} 100 \\ 85 \\ \hline \end{array}$$

$$\begin{array}{r} 60 \\ 51 \\ \hline \end{array}$$

$$\begin{array}{r} 70 \\ 68 \\ \hline \end{array}$$

$$\begin{array}{r} 110 \\ 102 \\ \hline \end{array}$$

$$\begin{array}{r} 150 \\ 136 \\ \hline \end{array}$$

$$\begin{array}{r} 90 \\ 85 \\ \hline \end{array}$$

$$\begin{array}{r} 20 \\ 17 \\ \hline \end{array}$$

$$\begin{array}{r} 80 \\ 63 \\ \hline \end{array}$$

$$495 \left\{ \begin{array}{r|l} 5 & 67.0 \\ 9 & 13.4 \\ 11 & 1.488 \\ \hline & .135 \end{array} \right. \quad (3)$$

$$1375 \left\{ \begin{array}{r|l} 5 & 17.0 \\ 5 & 3.40 \\ 5 & .680 \\ 11 & .136 \\ \hline & .0123\bar{6} \end{array} \right.$$

$$\therefore \text{Ans.} = 11.135;$$

$$\therefore \text{Ans.} = 23.012\dot{3}\dot{6}$$

$$(4) \quad \begin{aligned} \cdot 2 &= \frac{2}{9}; \cdot 0\dot{5} = \frac{5}{99}; \cdot 1\dot{8} = \frac{18}{99} = \frac{2}{11}; \cdot 1\dot{5}\dot{6} = \frac{156}{990} = \frac{13}{82\frac{1}{2}} = \frac{26}{165} = \frac{2}{15}; \\ \cdot 0270\dot{2}\dot{7} &= \frac{27027}{99000} = \frac{27027}{99000} = \frac{1}{37}; \\ \cdot 28571\dot{4} &= \frac{285714}{99999} = \frac{2}{7}. \end{aligned}$$

$$\begin{aligned} & \cdot 566 = \frac{566}{900} = \frac{510}{900} = \frac{17}{30}; \quad \cdot 745 = \frac{745}{900} = \frac{736}{900} = \frac{368}{450}; \\ & \cdot 20235 = \frac{20235}{90000} = \frac{2333}{9000}; \quad 19\cdot 305 = 19\frac{305}{1000} = 19\frac{75}{200} \\ & = 19\frac{15}{40}; \quad 20\cdot 02916 = 20\frac{2916}{100000} = 20\frac{2725}{9000} = 20\frac{71}{240}. \end{aligned}$$

[illegible]

$$\begin{array}{r} (7) \\ 4\overline{)3333333} \\ 16\overline{)4545454} \\ 75\overline{)7352352} \\ \hline 96\overline{)5231139} \end{array}$$

$\therefore \text{Ans.} = 96\overline{)523114}.$

$$\begin{array}{r} (8) \\ 3 \cdot 2333333 \\ 26 \cdot 7967967 \\ 7 \cdot 4134134 \\ \hline 37 \cdot 4435434 \end{array}$$

$\therefore \text{Ans.} = 37 \cdot 443543$

$$\begin{array}{r} (9) \\ 3 \cdot 8564646 \\ 2 \cdot 0387777 \\ \hline 1 \cdot 8176869 \end{array}$$

$\therefore \text{Ans.} = 1 \cdot 817686.$

$$\begin{array}{r} (10) \\ 52 \cdot 866666 \\ 8 \cdot 3723572 \\ \hline 44 \cdot 4943094 \end{array}$$

$\therefore \text{Ans.} = 44 \cdot 494309.$

$$(11) \quad 7\bar{6} + 5\bar{3} = 7\frac{8}{9} \times 5\frac{1}{3} = 40\frac{8}{9}; \quad 35\bar{1} \times 7\bar{3}6 = \frac{351}{9} \times \frac{736}{8} = \frac{1}{8} \times \frac{3}{9} \times 1104 = \frac{1}{24} \times 1104 = 46$$

(12)

$$\begin{aligned} 6\cdot\dot{7} \div 2\cdot\dot{6} &= 6\frac{7}{9} \div 2\frac{2}{3} = \frac{61}{9} \times \frac{3}{8} = \frac{61}{24} = 2\frac{13}{24} = 2\cdot541\dot{6}; \quad 262\dot{7} \\ &\div 1\cdot92\dot{6} = \frac{2627}{900} \div \frac{1926}{100} = \frac{262700}{90000} \div \frac{1926}{100} = \frac{262700}{17934} = 1\frac{6074}{900} = 1\cdot3\dot{6}; \quad 37\dot{1} \div 5 = \frac{3710}{5} \div 5 = \frac{368}{5} \div 5 \\ &= \frac{184}{25} = 0\cdot74\dot{8}; \quad 42\cdot0463 \div 1\cdot3\dot{6} = 42\cdot\frac{463}{10000} \div 1\frac{36}{99} = \\ &42\cdot\frac{463}{10000} \times \frac{11}{16} = \frac{4625093}{150000} = 30\cdot83395\dot{3}. \end{aligned}$$

Ex. LXII. (p. 105.)

$$\begin{array}{r} (1) \\ .75 \\ 100 \\ \hline 75.00 \text{ cts.} \\ \text{Ans. } 75 \text{ cts.} \end{array}$$

(2)
·875
5
—
\$4·375
100

$$\begin{array}{r} (3) \\ -625 \\ \underline{100} \\ 62.500 \text{ cts.} \\ \text{Ans. } 62\frac{1}{2} \text{ cts.} \end{array}$$

37.500 cts. Ans. \$4.37 $\frac{1}{2}$ cts.

$$\begin{array}{r} (4) \\ \cdot 625 \text{ cwt.} \\ 4 \\ \hline 2 \cdot 500 \text{ qrs.} \\ 25 \end{array}$$

$$\begin{array}{r} (5) \\ \cdot 375 \\ 8 \\ \hline 3 \cdot 000 \text{ fur.} \\ \text{Ans. 3 fur.} \end{array}$$

$$\begin{array}{r} (6) \\ \cdot 175 \\ \underline{20} \\ 3 \cdot 500 \text{ cwt.} \\ \underline{4} \\ 2 \cdot 000 \text{ qrs.} \\ \text{Ans. } 3 \text{ cwt. } 2 \text{ qrs.} \end{array}$$

$$\begin{array}{r} 2500 \\ 1000 \\ \hline 12500 \text{ lbs.} \\ 16 \end{array}$$

3000
500

8.000 oz. Ans. 2 qrs. 12 lbs. 8 oz. .

$$\begin{array}{r} (7) \\ \cdot 46875 \\ \underline{50} \\ 23\cdot 43750s. \\ \underline{12} \end{array}$$

$$\begin{array}{r} 5\cdot 25000d. \\ \underline{4} \end{array}$$

$$\begin{array}{r} 1\cdot 00000q. \\ \underline{4} \end{array} \quad \text{Ans. } 23s. 5\frac{1}{4}d.$$

$$\begin{array}{r} (10) \\ 4\cdot 65 \times 4 \text{ a. } 2 \text{ ro.} \\ \underline{4\cdot 65} \\ 18 \end{array}$$

$$\begin{array}{r} 3720 \\ \underline{465} \end{array}$$

$$\begin{array}{r} 83\cdot 70 \text{ ro.} \\ \underline{40} \end{array}$$

$$28\cdot 00 \text{ per.}$$

$$\text{Ans. } 83 \text{ ro. } 28 \text{ per., or } 20 \text{ a. } 3 \text{ ro. } 28 \text{ per.}$$

$$\begin{array}{r} (12) \\ 2\cdot 56 \\ \underline{525} \end{array}$$

$$\begin{array}{r} 1280 \\ \underline{512} \\ 1280 \end{array}$$

$$1344\cdot 00 \text{ qrs.}$$

$$\text{Ans. } 1344 \text{ qrs., or } \pounds 1 \text{ } 8s.$$

$$\begin{array}{r} (8) \\ \cdot 0625 \\ \underline{90} \end{array}$$

$$\begin{array}{r} 5\cdot 6250d. \\ \underline{4} \end{array}$$

$$2\cdot 5000q.$$

$$\text{Ans. } 5\frac{1}{2}d. \text{ } 5q. \quad \text{Ans. } 2 \text{ lbs. } 2 \text{ oz. } 2 \text{ dwt.}$$

$$\begin{array}{r} (9) \\ \cdot 175 \\ \underline{12} \end{array}$$

$$\begin{array}{r} 2\cdot 100 \text{ oz.} \\ \underline{20} \end{array}$$

$$2\cdot 000 \text{ dwt.}$$

$$\begin{array}{r} (11) \\ 10\cdot 04 \\ \underline{100} \end{array}$$

$$1004\cdot 00 \text{ per.}$$

$$\text{Ans. } 1004 \text{ per., or } 6 \text{ a. } 1 \text{ ro. } 4 \text{ per.}$$

$$\begin{array}{r} (13) \\ 5\cdot 00875 \\ \underline{25} \end{array}$$

$$\begin{array}{r} 2504375 \\ \underline{1001750} \end{array}$$

$$\begin{array}{r} 125\cdot 21875 \text{ dys.} \\ \underline{24} \end{array}$$

$$\begin{array}{r} 87500 \\ \underline{43750} \end{array}$$

$$\begin{array}{r} 5\cdot 25000 \text{ hrs.} \\ \underline{60} \end{array}$$

$$\text{Ans. } 125 \text{ dys. } 5 \text{ hrs. } 15 \text{ min.,} \\ \text{or } 17 \text{ wks. } 6 \text{ dys. } 5 \text{ hrs. } 15 \text{ min.}$$

$$15\cdot 00000 \text{ min.}$$

$$\begin{array}{r} (14) \\ 504 \\ 24 \\ \hline \end{array}$$

$$\begin{array}{r} 2016 \\ 1008 \\ \hline \end{array}$$

$$\begin{array}{r} 12\cdot096 \text{ hrs.} \\ 60 \\ \hline \end{array}$$

$$\begin{array}{r} 5\cdot760 \text{ min.} \\ 60 \\ \hline \end{array}$$

$$45\cdot600 \text{ sec.}$$

Ans. 12 dys. 12 hrs. 5 min. 45·6 sec.

$$\begin{array}{r} (16) \\ £4 \text{ 1s.} = 81\text{s.} \\ 3\cdot0085 \\ 81 \\ \hline \end{array}$$

$$\begin{array}{r} 30085 \\ 240680 \\ \hline \end{array}$$

$$\begin{array}{r} 243\cdot6885\text{s.} \\ 12 \\ \hline \end{array}$$

$$\begin{array}{r} 8\cdot2620\text{d.} \\ 4 \\ \hline \end{array}$$

$$1\cdot0480\text{q.}$$

Ans. 243s. 8d. 1·048q. or

$$£12 \text{ 3s. } 8\frac{1}{4}\text{d. } \cdot048\text{q.}$$

$$\begin{array}{r} (15) \\ 5 \text{ lbs. } 2 \text{ sc.} = 1442 \text{ sc.} \\ 3\cdot05 \\ \hline \end{array}$$

$$\begin{array}{r} 7210 \\ 4326 \\ \hline \end{array}$$

$$\begin{array}{r} 4398\cdot10 \\ 20 \\ \hline \end{array}$$

$$\begin{array}{r} 2\cdot00 \text{ grs.} \\ \text{Ans. } 4398 \text{ sc. } 2 \text{ grs., or } 15 \text{ lbs.} \\ 3 \text{ oz. } 2 \text{ drs. } 2 \text{ grs.} \end{array}$$

$$\begin{array}{r} (17) \\ 1 \text{ ac. } 3 \text{ ro. } 5 \text{ po.} = 285 \text{ po.} \\ 7\cdot034 \\ 585 \\ \hline \end{array}$$

$$\begin{array}{r} 35170 \\ 56272 \\ 14068 \\ \hline \end{array}$$

$$\begin{array}{r} 2004\cdot690 \text{ per.} \\ 30\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 20700 \\ 1725 \\ \hline \end{array}$$

$$\begin{array}{r} 20\cdot8725 \text{ yds.} \\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 7\cdot8525 \text{ ft.} \\ 144 \\ \hline \end{array}$$

$$\begin{array}{r} 34100 \\ 34100 \\ 8525 \\ \hline \end{array}$$

Ans. 2004 po. 20 yds. 7 ft. 122·76 in.

or 12 a. 2 ro. 4 po. 20 yds.

$$7 \text{ ft. } 122\cdot76 \text{ in.}$$

$$122\cdot7600 \text{ in.}$$

(18)

$$16 \text{ lbs. } 1 \text{ oz. } 6 \text{ grs.} = 92646 \text{ grs.}$$

92646

5·005

463230

463230

463693·230 grs.,

or 80 lbs. 6 oz. 13·23 grs.

$$(19) \cdot 3 \text{ of } \$2 = \frac{2}{3} \text{ or } \frac{1}{3} \text{ of } \$2 = 66\frac{2}{3} \text{ cts.}$$

$$(20) \cdot 54 \text{ of } 16\text{s. } 6\text{d.} = \frac{54}{9} \text{ of } 198\text{d.} = 108\text{d.} = 9\text{s.}$$

$$(21) \cdot 243 \text{ of a ton} = \frac{243}{900} \text{ of } 20 \text{ cwt.} = \frac{243}{900} \text{ of } 20 \text{ cwt.}$$

$$= \frac{73}{300} \text{ of } 20 \text{ cwt.} = 4 \text{ cwt. } 3 \text{ qrs. } 11 \text{ lbs. } 10 \text{ oz. } 10\frac{2}{3} \text{ drs.}$$

$$(22) 6\cdot 83 \text{ of } £5 = 6\frac{83}{100} \text{ of } £5 = 6\frac{15}{10} \text{ of } £5 = 6\frac{3}{2} \text{ of } £5$$

$$= £34\frac{1}{2} = £34 \text{ 3s. } 4\text{d.}$$

$$(23) 2\cdot 383 \text{ of } 2\frac{1}{2} \text{ lbs.} = 2\frac{383}{1000} \text{ of } 2\frac{1}{2} \text{ lbs.} = 2\frac{345}{1000} \text{ of } 2\frac{1}{2}$$

$$\text{lbs.} = 2\frac{3}{10} \text{ of } 2 \text{ lbs. } 6 \text{ oz.} = 2\frac{3}{10} \text{ of } 30 \text{ oz.} = 71\frac{1}{2} \text{ oz.} = 5 \text{ lbs.}$$

$$11 \text{ oz. } 10 \text{ dwt.}$$

$$(24) 6\cdot 2 \text{ of a c. yd.} = 6\frac{2}{5} \text{ of } 27 \text{ c. ft.} = 168 \text{ c. ft.} = 6 \text{ c.}$$

$$\text{yds. } 6 \text{ c. ft.}$$

$$(25) 18\cdot 72 \text{ of an ac.} = 18\frac{72}{100} \text{ ac.} = 18\frac{8}{11} \text{ ac.} = 18 \text{ ac. } 2 \text{ ro.}$$

$$36 \text{ po. } 11 \text{ yds.}$$

$$(26) 2\cdot 063 \text{ of } 1000 \text{ guineas} = 2\frac{63}{1000} \text{ of } 1000 \text{ gs.} = 2\frac{57}{1000}$$

$$\text{of } 1000 \text{ gs.} = 2\frac{19}{1000} \text{ of } 1000 \text{ gs.} = 2006\frac{1}{2} \text{ gs.} = 2006 \text{ gs. } 7\text{s.}$$

$$= £2166 \text{ 10s.}$$

$$(27) £\cdot 634375$$

20

·025

25

$$3\cdot 16 \text{ of } 30\text{s.} = 3\frac{16}{100} \text{ of } 30\text{s.}$$

$$\text{of } 30\text{s.} = 3\frac{1}{6} \text{ of } 30\text{s.}$$

$$= 95\text{s.} = £4 \text{ 15s.}$$

12·687500s.

125

12

50

8·250000d.

625s.

4

12

1·000000q.

7·500d.

4

2·000

$$\therefore \text{value reqd} = 12\text{s. } 8\frac{1}{4}\text{d.} + 7\frac{1}{2}\text{d.} + £4 \text{ 15s. } 3\frac{1}{4}\text{d.}$$

(28) $\frac{1}{6}$ of an ac. = $\frac{2}{3}$ ac. = $\frac{2}{3}$ ac. = 2 ro. 26 po. 20 yds.
 1 ft. 72 in.; $\frac{1}{625}$ of a ro. = $\frac{1}{625}$ of 40 po. = $\frac{40}{625}$ po. $\frac{4}{125}$ po.
 = $\frac{4}{125}$ of $30\frac{1}{4}$ yds. = 11 yds.

2 ro. 26 po. 20 yds. 1 ft. 72 in. + 25 po. 11 yds. = 3 ro.
 11 po. 9 yds. 1 ft. 72 in.

(29) $6\frac{7}{14285}$ of 1s. 9d. = $6\frac{14285}{99999}$ of 21d. = $6\frac{1}{7}$ of 21d.
 = 141d. = 11s. 9d.; $\frac{1}{0833}$ of £7 4s. = $\frac{2330}{833}$ of 144s. =
 $\frac{750}{999}$ of 144s. = $\frac{1}{12}$ of 144s. = 12s.; $\frac{1}{251190476}$ of 6s. 8d.
 = $\frac{251190476}{999999999}$ of 80d. = $\frac{251190476}{999999999}$ of 80d. = $\frac{211}{140}$ of
 80d. = 1s. $8\frac{2}{7}$ d.

\therefore value req^d = 11s. 9d. - 12s. + 1s. $8\frac{2}{7}$ d. = 1s. $5\frac{2}{7}$ d.

EX. LXIII. (p. 106.)

(1)

1 qr. 5 lbs. = 30 lbs.

1 cwt. = 4×25 = 100 lbs.

\therefore fr. req^d is $\frac{30}{100}$ or $\frac{3}{10}$ = .3.

or thus:

$$\begin{array}{r} 25 \overline{) 5} \\ 4 \overline{) 12} \\ \hline 3 \end{array}$$

(2)

\$2.50 = 250 cts.

\$10 = 1000 cts.

\therefore fr. req^d = $\frac{250}{1000}$ =
 $\frac{1}{4}$ = .25.

(3)

$$\begin{array}{r} 60 \overline{) 30} \\ 24 \overline{) 35} \\ \hline 14583 \end{array}$$

(4)

$$\begin{array}{r} 40 \overline{) 11} \\ 4 \overline{) 3275} \\ \hline 8175 \end{array}$$

(5)

$$\begin{array}{r} 4 \overline{) 2} \\ 12 \overline{) 65} \\ \hline 5416 \end{array}$$

(6) 2 fur. = $(2 \times 40 \times 5\frac{1}{2} \times 3 \times 12)$ in. = 15840 in.

\therefore fr. req^d is $\frac{3 \times 1 \times 2}{16 \times 80} = \frac{7}{3200}$ = .0022095.

(7) 2 oz. 13 dwt. = 53 dwt.; 1 lb. = 240 dwt.

\therefore fr. req^d = $\frac{53}{240}$ = .22083.

(8) 4 lbs. 2 sc. = 1154 sc.; 1 oz. = 24 sc.

\therefore fr. req^d = $\frac{1154}{24}$ = 48.083.

(9)

$$144 \left\{ \begin{array}{r} 12 \overline{) 73} \\ 12 \overline{) 608333} \\ 9 \overline{) 2506944} \\ \hline 2785493827160 \end{array} \right.$$

(10)

1 lb. Troy = 5760 grs.

1 lb. Avoir. = 7000 grs.

$\frac{5760}{7000}$ = .82285714.

$$\begin{array}{r} (11) \\ 12 \overline{) 9} \\ 20 \overline{) 10 \cdot 75} \\ \hline .5375 \end{array}$$

$$\begin{array}{r} (12) \\ 12 \overline{) 7} \\ 20 \overline{) 17 \cdot 5833} \\ \hline .87916 \end{array}$$

(13) 2 wks $6\frac{1}{4}$ dys. = 486 hrs.; 4 dys. 3 hrs. = 99 hrs.

\therefore fr. req^d = $\frac{486}{99} = 4\cdot90$.

(14) 2 lbs. 14 oz. = 46 oz.; 18 lbs. = 288 oz.

\therefore fr. req^d = $\frac{46}{288} = \frac{23}{144} = .15972$.

EX. LXIV. (p. 107.)

PAPER I.

(3)

$$\begin{array}{r} (1) \quad 1018269 \\ \quad 20979 \\ \quad 100001050 \\ 54000003000 \\ \quad 400000006 \\ \quad 999990 \\ \hline \end{array} \qquad \begin{array}{r} (2) \quad 400001 \\ \quad 300725 \\ \hline 99276 \end{array}$$

$$\begin{array}{r} 54502043294 \\ \quad 268936785 \\ \quad 5689 \\ \hline \end{array}$$

$$\begin{array}{r} 2420431065 \\ 2151494280 \\ 1613620710 \\ 1344683925 \\ \hline \end{array}$$

$$\begin{array}{r} 268936785) 1529981369865 (5689 \\ \underline{1344683925} \end{array}$$

$$\begin{array}{r} 1852974448 \\ 1613620710 \\ \hline \end{array}$$

$$\begin{array}{r} 2393537386 \\ 2151494280 \\ \hline \end{array}$$

$$\begin{array}{r} 2420431065 \\ 2420431065 \\ \hline \end{array}$$

Multiplication may be proved by division and *visa versa*.

$$\begin{array}{r} 6974 \overline{) 27027027027} \quad (5) \\ 20922 \end{array}$$

$$\begin{array}{r} 61050 \\ 55792 \end{array}$$

$$\begin{array}{r} 52582 \\ 48818 \end{array}$$

$$\begin{array}{r} 37647 \\ 34870 \end{array}$$

$$\begin{array}{r} 27770 \\ 20922 \end{array}$$

$$\begin{array}{r} 68482 \\ 62766 \end{array}$$

$$\begin{array}{r} 57167 \\ 55792 \end{array}$$

$$\begin{array}{r} 1375 \end{array}$$

(6)

$$\begin{array}{r} \text{mi.} \quad \text{fur.} \quad \text{per.} \\ 12 \quad 2 \quad 6 \\ 8 \end{array}$$

$$\begin{array}{r} 98 \\ 40 \end{array}$$

$$\begin{array}{r} 3926 \\ 5\frac{1}{2} \end{array}$$

$$\begin{array}{r} 19630 \\ 1963 \end{array}$$

$$\begin{array}{r} 21593 \\ 3 \end{array}$$

$$\begin{array}{r} 64779 \\ 13 \end{array}$$

$$\begin{array}{r} 777348 \end{array}$$

$$\begin{array}{r} 2875398 \\ 6974 \end{array}$$

$$\begin{array}{r} 15501592 \end{array}$$

$$\begin{array}{r} 27127786 \end{array}$$

$$\begin{array}{r} 34878582 \end{array}$$

$$\begin{array}{r} 23252388 \end{array}$$

$$\begin{array}{r} 27027025652 \\ 1375 \end{array}$$

$$\begin{array}{r} 27027027027 \end{array}$$

$$\begin{array}{r} 12 \overline{) 777348} \text{ in.} \end{array}$$

$$\begin{array}{r} 3 \overline{) 64779} \text{ ft.} \end{array}$$

$$\begin{array}{r} 21593 \text{ yds.} \end{array}$$

$$\begin{array}{r} 5\frac{1}{2} \overline{) 2} \end{array}$$

$$\begin{array}{r} 11 \overline{) 43186} \end{array}$$

$$\begin{array}{r} 40 \overline{) 3926} \text{ per.} \end{array}$$

$$\begin{array}{r} 8 \overline{) 98.6} \text{ per.} \end{array}$$

$$\begin{array}{r} 12.2 \text{ fur.} \end{array}$$

$$12 \text{ mi. } 2 \text{ fur. } 6 \text{ per.}$$

PAPER II.

(1)

$$\begin{array}{r|rrrr}
 2 & 27 & 36 & 42 & 48 \\
 2 & 27 & 18 & 21 & 24 \\
 3 & 27 & 9 & 21 & 12 \\
 \hline
 & 9 & 3 & 7 & 4
 \end{array}$$

$$\text{L. C. M.} = 2 \times 2 \times 3 \times 9 \times 7 \\ \times 4 = 3024.$$

$$\begin{array}{r|rrrrr}
 3 & 2 & 3^{(2)} & 5 & 6 & 9 \\
 & & & 5 & 2 & 3 \\
 \hline
 \text{L. C. M.} = 3 \times 5 \times 2 \times 3 = 90.
 \end{array}$$

(4)

$$\begin{array}{r|rr}
 2 & 8 & 14 \\
 & 4 & 7
 \end{array}$$

$$\text{L. C. M.} = 2 \times 4 \times 7 = 56; \quad 1000 \div 56 = 17\frac{8}{7}.$$

 \therefore Ans. 17 times.

(5)

$$(^1) 126\frac{1}{4} + 40\frac{1}{2} + 10\frac{1}{2} + 11\frac{1}{2} + 50\frac{1}{2} = 239\frac{1}{4} \text{ miles.}$$

$$(^2) \begin{array}{r} 4380000 \\ 8550000 \\ 1500000 \\ 550000 \\ 7000000 \\ 560000 \end{array}$$

$$\$22540000$$

$$957) 87920000 (91870.42$$

$$8613$$

$$1790$$

$$957$$

$$\begin{aligned}
 (^3) \$22540000 - \$560000 &= \\
 \$21980000; \quad \$21980000 \div \\
 239\frac{1}{4} &= 87920000 \div 957 = \\
 \$91870.42 \text{ and } \$8.06 \text{ over. } &
 \end{aligned}$$

$$8330$$

$$7656$$

$$6740$$

$$6699$$

$$4100$$

$$3828$$

$$2720$$

$$2720$$

$$1914$$

$$203$$

PAPER III.

(1)

$$(1) \quad 2\frac{1}{4} \left(\frac{1}{6} + \frac{2}{3} \right) + \frac{4}{9} \left(\frac{2}{3} - \frac{1}{7} \right) = (2\frac{1}{4} \times \frac{5}{6}) + (\frac{4}{9} \times \frac{1}{21}) = \frac{1}{8} + \frac{4}{189} = 1\frac{7}{8} + \frac{4}{189} = 1\frac{1323 + 352}{1512} = 1\frac{1675}{1512} = 2\frac{1675}{1512}.$$

$$(2) \quad 2\frac{1}{4} \left\{ \left(\frac{1}{6} + \frac{2}{3} \right) + \frac{4}{9} \left(\frac{2}{3} - \frac{1}{7} \right) \right\} = 2\frac{1}{4} \left\{ \frac{5}{6} + (\frac{4}{9} \times \frac{1}{21}) \right\} = 2\frac{1}{4} \left(\frac{5}{6} + \frac{4}{189} \right) = 2\frac{1}{4} \times \frac{403}{189} = \frac{9}{4} \times \frac{403}{189} = 2\frac{67}{162}.$$

(2) $\frac{2}{3}$ of $\frac{1}{2} = \$15000$, or $\frac{2}{3} = \$15000$; $\therefore \frac{1}{3} = \5000 , and the whole steamer is worth $\$5000 \times 8 = \40000 . If he sells $\frac{2}{3}$ he has remaining $\frac{1}{2} - \frac{2}{3} = \frac{1}{6}$; $\frac{1}{6}$ of $\$40000 = \5000 .

(3)

$$(1) \quad \frac{7}{12} (8\frac{1}{2} - 2\frac{1}{2}) - \frac{1}{2} (\frac{2}{3} - \frac{1}{11}) = \frac{7}{12} \times 5\frac{3}{4} - \frac{1}{2} \times \frac{2}{3} = \frac{1481}{176} = \frac{1271 - 75}{176} = 3\frac{7}{33}.$$

$$(2) \quad \frac{7}{12} \left\{ (8\frac{1}{2} - 2\frac{1}{2}) - \frac{1}{2} (\frac{2}{3} - \frac{1}{11}) \right\} = \frac{7}{12} \left\{ 5\frac{3}{4} - \frac{2}{3} \right\} = \frac{7}{12} \times \frac{287}{12} = \frac{2009}{24} = 3\frac{91}{8}.$$

(4) $55 \times £5 = £275$, or $£2 \ 15s.$; $5 \cdot 5 \times £5 = £27 \cdot 5$, or $£27 \ 10s.$, and $£27 \ 10s. - £2 \ 15s. = £24 \ 15s.$

(5) $1 \cdot 25 \text{ yds.} = \frac{5}{8}$ of 75 yds. \therefore No. yds. req^d $= \frac{5}{8}$ of $87 = 145 \text{ yds.}$; and $145 \text{ yds.} - 87 \text{ yds.} = 58 \text{ yds.}$

(6) $5 = \frac{1}{2} =$ part given to A ; $1 - \frac{1}{2} = \frac{1}{2} =$ part remaining; $\frac{2}{3}$ of $\frac{1}{2} = \frac{1}{3}$ of $\frac{1}{2} = \frac{1}{3}$ of $\frac{1}{2} = \frac{1}{6} =$ part given to C ; $\frac{1}{2} + \frac{1}{6} = \frac{2}{3} =$ whole part give away; $1 - \frac{2}{3} = \frac{1}{3} =$ part remaining to A .

PAPER IV.

(1) $\frac{1}{3} =$ part sold to A ; $\frac{2}{3} =$ part remaining; $\frac{1}{3}$ of $\frac{2}{3} = \frac{2}{9} =$ part sold to B ; $1 - (\frac{1}{3} + \frac{2}{9}) = \frac{4}{9} =$ part sold to C , which by the question $= 32$. If $\frac{2}{9} = 32$ then $\frac{1}{9} = 32 \div 2 = 16$, and $\frac{1}{3} = 16 \times 2 = 32$, and $\frac{1}{9} = 16$ or the whole $= 4 \times 15 = 60$.

$$(2) \quad 13\frac{1}{2} + 56\frac{3}{4} + 14\frac{5}{8} = 13 + 56 + 14 + \frac{1}{2} + \frac{3}{4} + \frac{5}{8} = 83 + \frac{4 + 6 + 5}{8} = 84\frac{15}{8} = 84 \cdot 875.$$

$$13\frac{1}{2} = 13 \cdot 5; \quad 56\frac{3}{4} = 56 \cdot 75; \quad 14\frac{5}{8} = 14 \cdot 625.$$

 \therefore Sum is

13·5

56·75

14·625

84·875

(3)

2·7)·033372 (·01236

27

63

54

97

81

162

162

$ \begin{array}{r} 27 \times 4 = \$108.00 \\ 6 \times 20 = 1.20 \\ 9\frac{1}{2} \times 4 \times 5 \div 12 = .15\frac{5}{6} \\ \hline \$109.35\frac{5}{6} \\ \\ 3 \times 4 = \$12.00 \\ 12 \times 20 = 2.40 \\ 7 \times 4 \times 5 \div 12 = .11\frac{2}{3} \\ \hline \$14.51\frac{2}{3} \end{array} $	(4)	$ \begin{array}{r} 19 \times 4 = \$76.00 \\ 5 \times 20 = 1.00 \\ 8 \times 4 \times 5 \div 12 = .13\frac{1}{3} \\ \hline \$77.13\frac{1}{3} \\ \\ \$109.35\frac{5}{6} \\ \$ 17.22 \\ \$ 77.13\frac{1}{3} \\ \$198.05 \\ \$ 14.51\frac{2}{3} \\ \hline \$416.27\frac{5}{6} \end{array} $
---	-----	---

(5) $.875 = \frac{875}{1000} = \frac{7}{8}$; $21 = \frac{7}{8}$ of the larger side, or $\frac{1}{8} = 3$ and $\frac{8}{8}$ or the whole = 24; $21 + 24 = 45 =$ whole number of players, which is equal to $.625$ or $\frac{625}{1000}$, or $\frac{5}{8}$ of the onlookers; if $\frac{5}{8} = 45$, $\frac{1}{8} = 45 \div 5 = 9$, and $\frac{8}{8}$ or the whole = $9 \times 8 = 72$.

(6) $.014$ of $1\frac{2}{3}$ of $\frac{1\frac{1}{2}}{5\frac{2}{5}}$ of $\frac{5}{7}$ of $4\frac{5}{6}$ of $\frac{\frac{2}{3} + \frac{1}{2}}{\frac{2}{3} - \frac{1}{2}}$ of $71\frac{1}{7} = 1\frac{14}{1000}$

of $\frac{7}{6}$ of $\frac{\frac{6}{27}}{\frac{6}{6}}$ of $\frac{5}{7}$ of $4\frac{1}{2}$ of $\frac{\frac{7}{6}}{\frac{1}{6}}$ of $\frac{500}{700} = \frac{7}{6}$ of $\frac{2}{9}$ of $\frac{5}{7}$ of $\frac{2}{9}$ of $\frac{500}{700} = 7$.

\therefore one side scores 7 times as many runs as the other.

PAPER V.

(1) Let 1 represent what B owes to A ; then $.6$, or $\frac{6}{10}$ or $\frac{3}{5} =$ what C owes to B ; $1 - \frac{3}{5} = \frac{2}{5} =$ how much B 's debt to A exceeds that of C 's to B . If $\frac{2}{5} = 5s$, then $\frac{1}{5} = 2s$, $6d.$, and $\frac{5}{5}$, or the whole = $2s$, $6d. \times 5 = 12s$, $6d.$

(2) $\frac{1}{2} + 50s. =$ what was first taken out; $\therefore \frac{1}{2} - 50s. =$ what then remained. $.2$ or $\frac{2}{10}$, or $\frac{1}{5}$ of $(\frac{1}{2} - 50s.) + 30s. = \frac{1}{10} + 20s. =$ what was next taken; $(\frac{1}{2} + 50s.) + (\frac{1}{10} + 20s.) = (\frac{6}{10} + 70s.) =$ what had then been taken out; $\therefore \frac{1}{10} - 70s. =$ what was left. $.25$ or $\frac{25}{100}$, or $\frac{1}{4}$ of $(\frac{1}{10} - 70s.) + 20s. = \frac{1}{10} - 17\frac{1}{2}s. + 20s. = \frac{1}{10} + 2\frac{1}{2}s. =$ what was taken out the third time. $(\frac{6}{10} + 70s.) + (\frac{1}{10} + 2\frac{1}{2}s.) = \frac{7}{10} + 72\frac{1}{2}s. =$ total amount taken out; $\therefore \frac{3}{10} - 72\frac{1}{2}s. =$ amount remaining in the bag, which by the question = $10s.$ $\therefore \frac{1}{10} - 72\frac{1}{2}s. = 10s.$, or $\frac{1}{10} = 82\frac{1}{2}s.$, or $\frac{1}{10} = 27\frac{1}{2}s.$, $\therefore \frac{1}{10}$ or the whole = $27\frac{1}{2}s. \times 10 = 275s.$

(3) *A* supplies 26 cub. yds. in $3\frac{1}{4}$ hrs., or 8 cub. yds. per hr.; *B* supplies $12\frac{1}{2}$ cub. yds. in $2\frac{1}{2}$ hrs., or 5 cub. yds. per hr. Together *A* and *B* supply $8 + 5 = 13$ cub. yds. per hr. *C* discharges 11.375 , or $11\frac{3}{8}$ cub. yds. in $1\frac{1}{4}$ hrs., or $6\frac{1}{2}$ cub. yds. per hr.

In 12 hrs. *A* will supply $8 \times 12 = 96$ cub. yds.; and *C* will discharge $6\frac{1}{2} \times 12 = 78$ cub. yds.; \therefore the number of cub. yds. actually filled will be $96 - 78 = 18$. Number cub. yds. requiring to be filled $= 75$, or $\frac{3}{4}$ of $286 = 214\frac{1}{2}$ cub. yds., and number already filled $= 18$; \therefore No. remaining to be filled $= 214\frac{1}{2} - 18 = 196\frac{1}{2}$ cub. yds. Now if *A* and *B* together fill 13 cub. yds. per hr. while *C* discharges $6\frac{1}{2}$ cub. yds. per hr., the number of cub. yds. actually filled per hr. is $13 - 6\frac{1}{2} = 6\frac{1}{2}$; and number of hrs. required to fill $196\frac{1}{2}$ cub. yds. $= 196\frac{1}{2} \div 6\frac{1}{2} = 30\frac{2}{3}$ hrs., which added to the previous 12 hrs. will amount to $42\frac{2}{3}$ hrs.

(4)

500 envelopes at 44 cts. per 100 . . .	= \$ 2.20
3 boxes elastic bands at 33 cts. . .	= \$ 0.99
$\frac{1}{2}$ gross penholders at 19 cts. per doz. . .	= \$ 1.14
$2\frac{1}{2}$ reams foolscap at 21 cts. a quire . . .	= \$10.50
4 doz. quill pens at 9 cts.	= \$ 0.36
13 note books at 27 cts.	= \$ 3.51
250 official envelopes at 48 cts. per 100 . . .	= \$ 1.20

(5)

	\$19.90
$7\frac{1}{2}$ lbs. lamb at 10 cts.	= \$0.75
$19\frac{1}{2}$ lbs. mutton at 8 cts.	= \$1.56
18 lbs. ham at 15 cts.	= \$2.70
$5\frac{1}{2}$ lbs. suet at 10 cts.	= \$0.55
9 chops at 4 cts.	= \$0.36

(6)

	\$5.92
17 yds calico at 19 cts.	= \$ 3.23
$25\frac{1}{2}$ yds. — at 55 cts.	= \$14.02 $\frac{1}{2}$
$34\frac{1}{2}$ yds. flannel at 60 cts.	= \$20.70
14 pairs stockings at 38 cts.	= \$ 5.32
5 pairs gloves at \$12 per doz.	= \$ 5.00

\$48.27 $\frac{1}{2}$

Ex. LXV. (p. 112.)

$$\begin{array}{llll}
 \text{(1)} & \text{(2)} & \text{(3)} & \text{(4)} \\
 \frac{9 \times 12}{4} = 27. & \frac{9 \times 24}{32} = 6\frac{3}{4}. & \frac{6 \times 10}{4} = 15. & \frac{\frac{1}{2} \times \frac{1}{2}}{\frac{1}{2}} = \frac{1}{6}. \\
 \text{(5)} & \text{(6)} & \text{(7)} \\
 \frac{.8 \times .79}{.05} = 12.64. & \frac{10 \times 4.5}{.3} = 15. & \frac{\frac{5}{7} \times \frac{1.5}{2}}{\frac{1}{2} \frac{9}{1}} = \frac{8}{9}. \\
 \text{(8)} & \text{(9)} & \text{(10)} \\
 \frac{1.2 \times .39}{1.3} = .36. & \frac{\frac{9}{14} \times \frac{7}{12}}{\frac{1}{8}} = \frac{3}{4}. & \frac{4.22 \times 17.6}{23\frac{2}{9}} = 3.2.
 \end{array}$$

Ex. LXVI. (p. 115.)

(1) 8 bus. : 24 bus. :: \$16 is to the price required.

∴ Price required = $\$ \frac{24 \times 16}{8} = \$48.$

(2) 2 bus. : 33 bus. :: \$1.10 : required price.

∴ Required price = $\$ \frac{33 \times 1.10}{2} = \$18.15.$

(3) 9 bus. : 4 bus. 20 lbs. :: \$36 : required cost.

∴ Required cost = $\$ \frac{260 \times 36}{540} = \$17.33\frac{1}{3}.$

(4) 55 cts. : \$21.25 :: 1 bus. : no. of bus. required.

∴ No. required = $\frac{2125 \times 1}{55}$ bus. = 38 bus. 21 $\frac{1}{5}$ lbs.

(5) 84 cts. : \$17.20 :: 1 bus. : number required.

∴ No. required = $\frac{1720 \times 1}{84}$ bus. = 20 bus. 28 $\frac{1}{3}$ lbs.

(6) 1 oz. : 21 lbs. 4 oz. :: 6s. 5d. : required price.

∴ Required price = $\frac{256 \times 77}{1}$ d. = 19712d. = £32 2s. 8d.

(7) 16 cts. : \$462.33 :: 1 lb. : number required.

∴ No. required = $\frac{46236 \times 1}{16}$ lbs. = 2889 $\frac{3}{4}$ lbs. = 28 cwt.

3 qrs. 14 lbs. 12 oz.

(8) \$23856 : \$10496.64 :: \$1 : dividend in \$1.

∴ Dividend required = $\$ \frac{1049664 \times 1}{2385600} = \$44 = 44$ cts.

(9) No. of days in 1864 = 366.

366 dys. : 1 dy. :: \$106.14 : amount required.

∴ Amount required = $\frac{10614 \times 1}{366}$ cts. = 29 cts.

(10) 1 ml. : 20 mls. 5 fur. 22 yds. :: \$393.75 : req^d. cost.

∴ Required cost = $\$ \frac{393.75 \times 35232}{1760} = \$8126.01\frac{9}{16}$.

(11) \$123.12 : \$449.28 :: 6 cwt. 2 qrs. : weight req^d.

∴ Required weight = $\frac{26 \times 44928}{13312}$ qrs. = $87\frac{3}{4}$ qrs. =

21 cwt. 3 qrs. 18 lbs. 12 oz.

(12) \$32.15 : \$286.66 $\frac{1}{2}$:: \$183.75 : value required.

∴ Value required = $\$ \frac{183.75 \times 28666\frac{1}{2}}{3215} = \$1638.40\frac{535}{1280}$.

(13) \$10000 : \$3875 :: \$1 : dividend on \$1.

∴ Dividend = $\$ \frac{3875 \times 1}{10000} = .3875 = 38\frac{3}{4}$ cts.

∴ Each creditor will lose in \$1, \$1 - 38 $\frac{3}{4}$ cts. = 61 $\frac{1}{4}$ cts.

(14) 60 men : 84 men :: 5 months : time required.

∴ Time required = $\frac{85 \times 5}{60}$ mos. = 7 mos. 7 mos.

-5 mos. = 2 months.

(15) 1134 yds. : 5313 yds. :: 3s. 4 $\frac{1}{2}$ d. : value req^d.

∴ Value req^d. = $\frac{5313 \times 81}{1134}$ half pence = 15s. 9 $\frac{3}{4}$ d.

(16) £1 : 17s. 6d. :: £3057 12s. : value required.

∴ Value of effects = $\frac{210 \times 61152}{240}$ s. = £2675 8s.

(17) 10 ft. 8 in. : 1 mi. 1280 yds. :: 4 steps : required number of steps.

∴ No. required = $\frac{109440 \times 4}{128}$ steps = 3420 steps.

(18) 31 ac. 3 ro. 9 po. 21 yds. : 49 ac. 3 ro. 38 po. 21 yds. :: £3025 12s. 4 $\frac{1}{2}$ d. : required price.

∴ Req^d. price = $\frac{967769 \times 1452297}{615853}$ half pence = £4754

10s. 10 $\frac{1}{2}$ d.

(19) Loss on \$1 = \$1 - 59 cts. = 41 cts.

\$1 : \$13675 :: 41 cts. : required loss.

$$\therefore \text{Loss} = \frac{13675 \times 41}{1} \text{ cts.} = \$5606.75.$$

(20) 6 mi. : 10 mi. :: 1 hr. : time req^d. by 1st boy,

$$\therefore \text{time required} = \frac{10 \times 1}{6} \text{ hrs.} = 1 \text{ hr. } 40 \text{ min.}; \text{ also } 7\frac{1}{2}$$

mi. : 10 mi. :: 1 hr. : time required by 2nd boy, \therefore

$$\text{time required} = \frac{10 \times 1}{7\frac{1}{2}} \text{ hrs.} = 1 \text{ hr. } 20 \text{ min.}$$

Therefore since 1 hr. 40 min. - 1 hr. 20 min. = 20 min.
the first boy must start 20 minutes before second boy.

(21) 55 yds. : $\frac{1}{2}$ mi. :: 5 ft. : required gain.

$$\therefore \text{Required gain} = \frac{880 \times 5}{55} \text{ ft.} = 80 \text{ ft.} = 26 \text{ yds. } 2 \text{ ft.}$$

(22) 45 cts. : 55 cts. :: 36 doz. pairs : required no. of pairs.

$$\therefore \text{Required no.} = \frac{36 \times 55}{45} \text{ doz.} = 44 \text{ doz.} = 528 \text{ pairs.}$$

(23) 168 dys. : 266 dys. :: 103 men : required no. of men.

$$\therefore \text{Required no.} = \frac{266 \times 103}{168} \text{ men} = 171 \text{ men.}$$

(24) \$12571.87 $\frac{1}{2}$: \$1 :: \$419.06 $\frac{1}{2}$: rate per \$.

$$\therefore \text{Rate per \$} = \$ \frac{419.06\frac{1}{2} \times 1}{12571.87\frac{1}{2}} = 3\frac{1}{2} \text{ cts.}$$

Also, \$1 : \$1734.37 $\frac{1}{2}$:: 3 $\frac{1}{2}$ cts. : required payment.

$$\therefore \text{Req^d. payment} = \$ \frac{346875 \times 3\frac{1}{2}}{200} \text{ cts.} = \$57812\frac{1}{2}.$$

(25) Number of days in 1863 = 365.

Yearly expenditure = \$2500 - \$994.37 $\frac{1}{2}$ = \$1505.62 $\frac{1}{2}$.

365 dys. : 1 dy. :: \$1505.62 $\frac{1}{2}$: average daily expenditure.

$$\therefore \text{Req^d. expenditure} = \$ \frac{1505.62\frac{1}{2} \times 1}{365} = \$4.12\frac{1}{2}.$$

(26) 20 dys. : 27 dys. :: 100 men : req^d. no. of men.

$$\therefore \text{Req}^d. \text{ no. of men} = \frac{27 \times 100}{20} \text{ men} = 135 \text{ men.}$$

(27) 44 ft. : 109 miles :: 1 sec. : time req^d. by train.

$$\therefore \text{Time required} = \frac{575520 \times 1}{44} \text{ sec.} = 13080 \text{ sec.} = 3$$

hrs. 38 min.; 8 hrs. + 3 hrs. 38 min. = 11 hrs. 38 min.

(28) 22 cts. : \$1718.75 :: \$1 : amount of debt.

$$\therefore \text{Required amt.} = \frac{171875 \times 100}{22} \text{ cts.} = \$7812.50.$$

Also, his amount of indebtedness to first creditor will be \$7812.50 - (\$1250 \times 2 + \$816 \times 3) = \$7812.50 - \$4948 = \$2864.50.

Then \$1 : \$2864.50 :: 22 cts. : what first creditor will receive.

$$\therefore \text{1st cr. will receive} \frac{286450 \times 22}{100} \text{ cts.} = \$630.19, \text{ and}$$

will therefore lose \$2864.50 - \$630.19 = \$2234.31.

(29) 42s. : 70s. :: 4½d. : required cost.

$$\therefore \text{Req}^d. \text{ cost} = \frac{70 \times 9}{42} \text{ half pence} = 7\frac{1}{2} \text{d.}$$

(30) 5 men + 5 boys = 5 men + 3 men = 8 men.

10 men : 8 men :: 15 days : time required.

$$\therefore \text{Time required} = \frac{8 \times 15}{10} \text{ days} = 12 \text{ days.}$$

(31) 1 lb. 10 oz. 10 dwts. : 1 oz. :: £6 3s. 9d. : req^d. 4th term.

$$\therefore \text{4th proportional} = \frac{20 \times 1485}{450} \text{ d.} = 5\text{s. } 6\text{d.}$$

(32) Expenditure for the year will be \$2034.50 - \$250 = \$1784.50. Also, the year 1864 contains 366 days, and January 31 days.

366 days : 31 days :: \$1784.50 : req^d. expenditure.

$$\therefore \text{Req}^d. \text{ expenditure} = \frac{31 \times 1784.50}{366} = \$151.14\frac{1}{3}.$$

$$(32) \text{ £1}-6\text{d.} = 19\text{s. } 6\text{d.}$$

$$19\text{s. } 6\text{d.} : \text{£1} :: \text{£377 } 10\text{s.} : \text{original income.}$$

$$\therefore \text{Original income} = \frac{240 \times 17550}{234} \text{ s.} = \text{£900.}$$

$$(34) (1) 7\text{d.} : \text{£29 } 3\text{s. } 4\text{d.} :: \text{£1} : \text{required income.}$$

$$\therefore \text{Reqd. income} = \text{£} \frac{7000 \times 1}{7} = \text{£1000.}$$

$$(2) \text{ £1}-7\text{d.} = 19\text{s. } 5\text{d.}$$

$$19\text{s. } 5\text{d.} : \text{£1} :: \text{£932} : \text{required income.}$$

$$\therefore \text{Reqd. income} = \text{£} \frac{240 \times 932}{233} = \text{£960.}$$

$$(35) \text{ Weight of gold} = (\text{£150} \div \text{£3 } 17\text{s. } 10\frac{1}{2}\text{d.}) \text{ oz} = 38\frac{978}{1869} \text{ oz.}$$

$$1 \text{ lb.} : 38\frac{978}{1869} \text{ oz.} :: 54\text{s. } 6\text{d.} : \text{required value.}$$

$$\therefore \text{Reqd. val.} = \frac{\frac{72000}{1869} \times 654}{12} \text{ d.} = \frac{72000 \times 654}{1869 \times 12} \text{ d.} = \frac{1208000}{623} \text{ d.}$$

$$= 2099\frac{1}{2} \text{ d.} = 42\frac{6}{13} \text{ q.} = \text{£3 } 14\text{s. } 11\frac{1}{2} \text{ d.} = 62\frac{6}{13} \text{ q.}$$

(36) If 25 men can finish the work in 16 days, 1 man in 1 day will do $\frac{1}{16 \times 25} = \frac{1}{400}$ of the work. If all the men work for 4 days they will do $\frac{1}{4}$ of the whole work. $\therefore \frac{3}{4}$ remain to be done.

Then $\frac{1}{400} : \frac{3}{4} :: 1 \text{ man} : \text{no. that would finish it in 1 day.}$ $\therefore \text{No. reqd.} = \frac{\frac{3}{4} \times 1}{\frac{1}{400}} = \frac{3 \times 1 \times 400}{4} = 300 \text{ men, and}$
therefore 10 men can finish it in 30 days.

$$(37) 1 \text{ ct.} + 1\frac{1}{2} \text{ cts.} = 2\frac{1}{2} \text{ cts.} \quad \$1 - 2\frac{1}{2} \text{ cts.} = 97\frac{1}{2} \text{ cts.}$$

$$97\frac{1}{2} \text{ cts.} : \$1 :: \$1855 : \text{required income.}$$

$$\therefore \text{Reqd. income} = \$ \frac{1855 \times 100}{97\frac{1}{2}} = \$1902.56\frac{1}{3}.$$

$$(38) \frac{4}{9} \text{ qrs.} : \frac{4}{9} \text{ bus.} :: 54\text{s.} : \text{required price.}$$

$$\therefore \text{Reqd. price} = \frac{\frac{4}{9} \times 54}{\frac{4}{9} \times 8} = \frac{4 \times 54 \times 9}{6 \times 9 \times 8} \text{ s.} = 3\text{s. } 6\text{d.}$$

$$(39) 1\frac{3}{4} \text{ cwt.} : 1\frac{6}{11} \text{ ton} :: \text{£7 } 2\text{s.} : \text{required price.}$$

$$\therefore \text{Reqd. price} = \frac{1\frac{6}{11} \times 20 \times 143}{1\frac{3}{4}} \text{ s.} = \frac{6 \times 20 \times 143 \times 15}{11 \times 13} \text{ s.} =$$

£20.

(40) $1\frac{2}{5}$ d. : £1 6s. 6d. :: $\frac{1}{192}$ of $\frac{2}{3}$ of $2\frac{1}{2}$ of 4 lbs : required number of lbs.

$$\therefore \text{Reqd. no. of lbs.} = \frac{\frac{1}{192} \times \frac{2}{3} \times 2\frac{1}{2} \times 40 \times 318}{1\frac{3}{5}} \text{ lbs.} = 104\frac{1}{5} \text{ lbs.} = 104 \text{ lbs. } 2\frac{2}{5} \text{ oz.}$$

(41) From 6 A. M. on Sunday till Tuesday noon are 54 hours, and till 1 P. M. on Saturday the clock will indicate 151 hours.

\therefore 54 hrs. 24 min. : 151 hrs. :: 24 min. : gain on true time.

$$\therefore \text{Gain on true time} = \frac{151 \times 60 \times 24}{3264} \text{ min.} = 66\frac{3}{4} \text{ min.,}$$

$$\therefore \text{true time will be 1 P. M.} - 66\frac{3}{4} \text{ min.} = 11\cdot53\frac{1}{4} \text{ A. M.}$$

(42) While hour hand travels 5 minutes, minute hand travels 60 minutes, \therefore the minute hand gains 55 minutes per hour.

\therefore 55 min. : 1 hour :: 60 min. : time required.

$$\therefore \text{Time reqd} = \frac{60 \times 60}{55} = 65\frac{5}{11} \text{ min.} = 1 \text{ hour } 5\frac{5}{11} \text{ min.}$$

(43) 5 lbs. : .0625 cwt. :: .0703125 of \$4 : reqd. price.

$$\therefore \text{Reqd. price} = \$ \frac{.0703125 \times 4 \times .0625 \times 20}{5} = \$35\cdot15625$$

$$= 35\cdot15625 \text{ cts.}$$

(44) 1 man = $\frac{9}{4}$ boys; 1 woman = $\frac{3}{7}$ boys; \therefore 5 men = $4\frac{5}{4}$ boys; 4 women = $3\frac{6}{7}$ boys; therefore 5 men, 4 women and 2 boys = $(4\frac{5}{4} + 3\frac{6}{7} + 2)$ boys = $18\frac{1}{2}$ boys.

\therefore $18\frac{1}{2}$ boys : 9 boys :: 18 days : no. required; \therefore required number of days = $\frac{2\frac{2}{5} \times 9}{\frac{2}{5}} \times 18 = 8\frac{1}{5}$.

(45) If $\frac{2}{3}$ of the estate be sold, the remr. will be $\frac{2}{3}$.

$\frac{1}{3}$ of $\frac{7}{9}$ of $\frac{2}{3}$: $\frac{2}{3}$:: $1\frac{1}{3}$ of $\frac{8}{9}$ of £600 : required price.

$$\therefore \text{Required price} = £ \frac{\frac{7}{9} \text{ of } \frac{8}{9} \text{ of } 600 \times \frac{2}{3}}{\frac{1}{3} \text{ of } \frac{7}{9} \text{ of } \frac{2}{3}} = £ \frac{623 \times \frac{2}{3}}{1\frac{1}{3}} =$$

$$£ \frac{623 \times 2}{14 \times 3} = £400\frac{1}{3}.$$

(46) 1 oz. : 2.683 lbs. :: £4.09 : required price.

$$\therefore \text{Required price} = £4.09 \times 2.683 \times 12 = £4\frac{1}{10} \times 2\frac{41}{60} \times 12 = £\frac{41 \times 161 \times 12}{10 \times 60} = £132\frac{1}{50} = £132 \text{ 0s. } 4\frac{1}{4}\text{d. } \frac{1}{5}\text{q.}$$

(47) 7 dys. : 1 dy. :: \$22.12 : amount earned by 4 men and 5 boys per day; \therefore amount of earnings = $\$ \frac{22.12 \times 1}{7} = \3.16 .

Also, 9 dys. : 1 dy. :: \$28.98 : amount earned by 3 men and 5 boys per day; \therefore amount = $\$ \frac{28.98 \times 1}{9} = \3.22 .

And if 4 men and 5 boys earn \$3.16 per day, 12 men and 15 boys will earn \$9.48 per day; similarly, if 3 men and 8 boys earn \$3.22 per day, 12 men and 32 boys will earn \$12.88 per day; or, 12 men and 32 boys will earn \$3.40 more than 12 men and 15 boys; \therefore the \$3.40 must have been earned by the extra 17 boys.

Then 17 boys : 1 boy :: \$3.40 : amount of a boy's earnings per day; \therefore amount = $\$ \frac{3.40 \times 1}{17} = 20 \text{ cts.}$

Now if 4 men and 5 boys earn \$3.16 per day, 4 men working alone will earn \$3.16 - \$1 (the earnings of 5 boys), or 4 men will earn \$2.16, or 1 man will earn 54 cts; \therefore a man and a boy will together earn (54 + 20) cts. per day = 74 cts.; \therefore 12 men and 12 boys will together earn (74 \times 12) cts. = \$8.88 per day.

Then \$8.88 : \$186.48 :: 1 day : req^d. no. of days.

$$\therefore \text{Required no.} = \frac{186.48 \times 1}{8.88} \text{ days} = 21 \text{ days.}$$

(48) If *A* completes the work in 5 hrs., in 1 hr. he will do $\frac{1}{5}$ of it; \therefore 1 hr. : 40 min :: $\frac{1}{5}$: amount of work that *A* performs; \therefore amount that *A* performs = $\frac{40 \times \frac{1}{5}}{60} = \frac{2}{3}$.

Also, if *B* can finish the work in 9 hrs., in 1 hr. he will do $\frac{1}{9}$; \therefore 1 hr. : 1 $\frac{1}{2}$ hrs. :: $\frac{1}{9}$: amount that *B* per-

forms; \therefore amt. that B performs $= \frac{\frac{1}{9} \times 1\frac{1}{2}}{1} = \frac{1}{6}$.

$1 - (\frac{2}{15} + \frac{1}{6}) =$ amount remaining to be done $= \frac{7}{10}$.

Also, if C can perform the work in 15 hrs., in 1 hr. he will do $\frac{1}{15}$; $\therefore \frac{1}{15} : \frac{7}{10} :: 1 \text{ hr.} : \text{time required by } C \text{ to finish the remainder.}$

\therefore Time required $= \frac{\frac{7}{10} \times 1}{\frac{1}{15}}$ hours $= 10\frac{1}{2}$ hours.

(49) $(1500 + 700) \text{ men} : 1500 \text{ men} :: 11 \text{ months.} : \text{time required to consume the remaining provisions.}$

\therefore Time required $= \frac{1500 \times 11}{2200}$ mos. $= 7\frac{1}{2}$ mos., which, added to the 2 months during which the 1500 men had been consuming the provisions, gives $9\frac{1}{2}$ months.

(50) The first travels $4\frac{1}{2}$ miles per hr., and the second 3 miles per hr., therefore they together travel $7\frac{1}{2}$ miles per hour. $\therefore 7\frac{1}{2} \text{ miles} : 30 \text{ mls.} :: 1 \text{ hr.} : \text{no. of hrs. in which they will meet.}$

\therefore No. of hrs. $= \frac{30 \times 1}{7\frac{1}{2}}$ hrs. $= 4 \text{ hrs.};$ and 8.30 A. M. + 4 hrs. $= 12.30 \text{ P. M.}$

Also, $7\frac{1}{2} \text{ miles} : 4\frac{1}{2} \text{ miles} :: 30 \text{ miles} : \text{distance first travels.}$

\therefore Distance $= \frac{30 \times 4\frac{1}{2}}{7\frac{1}{2}} = 18 \text{ mls. i.e. } 12 \text{ mls. from Whitby,}$
or 10 miles from the given place.

(51) The 2 trains together go $(24 + 27) \text{ miles} = 51 \text{ miles per hour};$ the length of the 2 trains is $(210 + 180) \text{ feet} = 390 \text{ feet.}$

Therefore, $51 \text{ miles} : 390 \text{ feet} :: 1 \text{ hr.} : \text{reqd. time.}$

\therefore Required time $= \frac{390 \times 60 \times 60}{51 \times 5280} \text{ sec.} = 5\frac{49}{87} \text{ sec.}$

EX. LXVII. (p. 121.)

(1) $\left. \begin{array}{l} 10 : 15 \\ 9 : 12 \end{array} \right\} :: 4 \text{ weeks} : \text{no. of weeks required.}$

\therefore No. of weeks reqd $= \frac{4 \times 15 \times 12}{10 \times 9} \text{ weeks} = 8 \text{ wks.}$

$$(2) \quad \left. \begin{array}{l} 1 : 2 \\ 27 : 36 \end{array} \right\} :: 42 \text{ men} : \text{required number of men.}$$

$$\therefore \text{Required number} = \frac{42 \times 36 \times 2}{27 \times 1} = 112 \text{ men.}$$

$$(2) \quad \left. \begin{array}{l} 135 : 60 \\ 1 : 4 \end{array} \right\} :: 36 \text{ dys.} : \text{required number of dys.}$$

$$\therefore \text{Req'd. no. of days} = \frac{36 \times 4 \times 60}{135 \times 1} \text{ days} = 64 \text{ days.}$$

$$(4) \quad \left. \begin{array}{l} 104 : 102 \\ 34 : 122 \end{array} \right\} :: \$87.36 : \text{required cost.}$$

$$\therefore \text{Required cost} = \$ \frac{87.36 \times 122 \times 102}{34 \times 104} = \$207.44.$$

$$(5) \quad \left. \begin{array}{l} \$100000 : \$1500000 \\ 3 : 7 \end{array} \right\} :: \$2500 : \text{required gain.}$$

$$\therefore \text{Required gain} = \$ \frac{2500 \times 7 \times 1500000}{3 \times 100000} = \$87500.$$

$$(6) \quad \left. \begin{array}{l} 7 : 21 \\ \$2.80 : 4.06 \end{array} \right\} :: 40 \text{ miles} : \text{required no. of miles.}$$

$$\therefore \text{Req'd. no. of mls.} = \frac{40 \times 4.06 \times 21}{2.80 \times 7} = 174 \text{ miles.}$$

$$(7) \quad \left. \begin{array}{l} 7 : 45 \\ 20 : 9 \end{array} \right\} :: \$70 : \text{required cost.}$$

$$\therefore \text{Required cost} = \$ \frac{70 \times 9 \times 45}{20 \times 7} = \$202.50.$$

$$(8) \quad \left. \begin{array}{l} 24 : 16 \\ 560 : 1200 \end{array} \right\} :: 140 \text{ horses} : \text{req'd. no. of horses.}$$

$$\therefore \text{Req'd. no.} = \frac{140 \times 1200 \times 16}{560 \times 24} \text{ horses} = 200 \text{ horses.}$$

$$(9) \quad \left. \begin{array}{l} \$250 : \$625 \\ \$2000 : \$5000 \end{array} \right\} :: 16 \text{ months} : \text{req'd. no. of mos.}$$

$$\therefore \text{Req'd. no. of mos.} = \frac{16 \times 5000 \times 625}{2000 \times 250} = 100 \text{ months.}$$

$$(10) \quad \left. \begin{array}{l} 1878 : 22536 \\ 336 : 112 \end{array} \right\} :: 702 \text{ qrs.} : \text{req'd. no. of qrs.}$$

$$\therefore \text{Req'd. no. of qrs.} = \frac{702 \times 112 \times 22536}{336 \times 1878} = 2808 \text{ qrs.}$$

$$(11) \begin{array}{l} 6 : 24 \\ 4 : 2\frac{1}{4} \end{array} \} :: 17\frac{1}{2} \text{ acres} : \text{required no. of acres.}$$

$$\therefore \text{Req}^d. \text{ no. of ac.} = \frac{17\frac{1}{2} \times 2\frac{1}{4} \times 24}{4 \times 6} = 39 \text{ ac. 1 ro. 20 po.}$$

$$(12) \begin{array}{l} £240 : £234 \\ 91 : 49 \\ 56 : 48 \end{array} \} :: 20 \text{ months} : \text{req}^d. \text{ no of mos.}$$

$$\therefore \text{Req}^d. \text{ no. of mos.} = \frac{20 \times 48 \times 49 \times 234}{56 \times 91 \times 240} = 9 \text{ months.}$$

$$(13) \begin{array}{l} 100.8 \text{ lbs.} : 5186.16 \text{ lbs.} \\ 51.45 \text{ dys.} : 3 \text{ dys.} \end{array} \} :: 20 \text{ men} : \text{required number of men.}$$

$$\therefore \text{Req}^d. \text{ no. of men} = \frac{20 \times 3 \times 5186.16}{51.45 \times 100.8} = 60 \text{ men.}$$

$$(14) \begin{array}{l} 1 : \frac{1}{2} \\ \frac{1}{7} : 1 \end{array} \} :: 26 \text{ men} : \text{required number of men.}$$

$$\therefore \text{Req}^d. \text{ no.} = \frac{26 \times 1 \times \frac{1}{2}}{\frac{1}{7} \times 1} = \frac{26 \times 1 \times 1 \times 7}{2} = 91 \text{ men.}$$

or thus:

$$\begin{array}{l} 85 \text{ ac.} : 42\frac{1}{2} \text{ ac.} \\ 1\frac{5}{7} \text{ dys} : 12 \text{ dys.} \end{array} \} :: 26 \text{ men} : \text{req}^d. \text{ number of men.}$$

$$\therefore \text{Req}^d. \text{ no. of men} = \frac{26 \times 12 \times 42\frac{1}{2}}{1\frac{5}{7} \times 85} = 91 \text{ men.}$$

$$(15) \begin{array}{l} 16 \text{ men} : 3 \text{ men} \\ 1 : 2 \\ 9 : 10 \end{array} \} :: 6 \text{ dys.} : \text{req}^d. \text{ no. of men.}$$

$$\therefore \text{Req}^d. \text{ no. of men} = \frac{6 \times 10 \times 2 \times 3}{9 \times 1 \times 16} = 2\frac{1}{2} \text{ days.}$$

$$(16) \begin{array}{l} 24 : 16 \\ 18400 \text{ d.} : 24840 \text{ d.} \\ \frac{1}{2} : 1 \end{array} \} :: 25 \text{ men} : \text{req}^d. \text{ no. of men.}$$

$$\therefore \text{Required no. of men} = \frac{25 \times 24840 \times 16}{\frac{1}{2} \times 18400 \times 24} = 45 \text{ men.}$$

$$(17) \begin{array}{l} 6664 : 798 \\ 57 : 119 \\ \frac{1}{2} : 1 \end{array} \} :: 357 \text{ qrs.} : \text{required no. of qrs.}$$

$$\therefore \text{Req}^d. \text{ no. of qrs.} = \frac{357 \times 1 \times 119 \times 798}{\frac{1}{2} \times 57 \times 6664} = 178\frac{1}{2} \text{ qrs.} =$$

178 qrs. 4 bus.

$$(18) \begin{array}{l} 47.5 : 3.35 \\ 16 : 3.20 \end{array} \} :: \$1.14 : \text{required price per bus.}$$

$$\therefore \text{Required price} = \frac{1.14 \times 3.20 \times 3.35}{16 \times 47.5} = \$1.608.$$

$$(19) \begin{array}{l} 12 : 37\frac{1}{2} \\ 25 : 4 \end{array} \} :: \$14.40 : \text{required price.}$$

$$\therefore \text{Required price} = \$ \frac{14.40 \times 4 \times 37\frac{1}{2}}{25 \times 12} = \$7.20.$$

$$(20) \begin{array}{l} 6 : 4 \\ 12 : 8 \\ 220 : 175 \\ 35 : 36 \end{array} \} :: 11 \text{ days} : \text{required no. of days.}$$

$$\therefore \text{Req}^d. \text{ no. of dys.} = \frac{11 \times 36 \times 175 \times 8 \times 4}{35 \times 220 \times 12 \times 6} = 4 \text{ days.}$$

$$(21) \begin{array}{l} 20 : 18 \\ 135 \text{ in.} : 60 \text{ in.} \\ 378 \text{ in.} : 168 \text{ in.} \\ 80 : 100 \end{array} \} :: 9 \text{ dys.} : \text{required no. of dys.}$$

$$\therefore \text{Required no.} = \frac{9 \times 100 \times 168 \times 60 \times 18}{80 \times 378 \times 135 \times 20} = 2 \text{ days.}$$

$$(22) \begin{array}{l} 5 : 3 \\ 105 : 175 \\ 4 : 4\frac{1}{2} \\ 5 : 6 \end{array} \} :: 10 \text{ days} : \text{required no. of days.}$$

$$\therefore \text{Required no.} = \frac{10 \times 6 \times 4\frac{1}{2} \times 175 \times 3}{5 \times 4 \times 105 \times 5} \text{ dys.} = 13\frac{1}{2} \text{ dys.}$$

$$(23) \begin{array}{l} 8 : 12 \\ \$1.26 : \$1.80 \end{array} \} :: 1 \text{ lb. 11 oz. 12 drs.} : \text{req}^d. \text{w'ght.}$$

$$\therefore \text{Required weight} = \frac{444 \times 1.80 \times 12}{1.26 \times 8} \text{ drs.} = 6660 \text{ drs.}$$

$$= 3 \text{ lbs. 11 oz. } 7\frac{1}{2} \text{ drs.}$$

$$(24) \begin{array}{l} 48 : 64 \\ 15 : 1 \\ 22 : 825 \end{array} \} :: 7\frac{1}{2} \text{ horses (equivalent to 12 ponies),}$$

$$: \text{required number of horses.}$$

$$\therefore \text{Req}^d. \text{ no. of horses} = \frac{7\frac{1}{2} \times 825 \times 1 \times 64}{22 \times 15 \times 48} = 25 \text{ horses.}$$

$$(25) \left. \begin{array}{l} 11 : 9 \\ \frac{1}{4} : \frac{3}{4} \\ \frac{3}{7} : \frac{4}{7} \end{array} \right\} :: 55 \text{ men} : \text{reqd. number of men.}$$

$$\therefore \text{Reqd. no. of men} = \frac{55 \times \frac{1}{4} \times \frac{3}{4} \times 9}{\frac{3}{7} \times \frac{1}{4} \times 11} = 180 \text{ men.}$$

$$(26) \left. \begin{array}{l} 15 : 5 \\ 10 : 15 \\ 12 : 5 \\ 1 : 4 \end{array} \right\} :: 3 \text{ feet} : \text{required number of feet.}$$

$$\therefore \text{Required no. of feet} = \frac{3 \times 4 \times 5 \times 15 \times 5}{1 \times 12 \times 10 \times 15} = 2\frac{1}{2} \text{ feet.}$$

EX. LXVIII. (p. 124.)

(1) 25 cts. = $\frac{1}{4}$ of \$1	\$75.00 = value at \$1 each.
	<u>2</u>
	\$150.00 = value at \$2 each.
	18.75 = value at 25 cts. each.
	<u>\$168.75 = value at \$2.25 each.</u>
(2) 50 cts. = $\frac{1}{2}$ of \$1	\$105.00 = value at \$1 each.
	52.50 = value at 50 cts. each.
	<u>\$157.50 = value at \$1.50 each.</u>
(3) 50 cts. = $\frac{1}{2}$ of \$1	\$910.00 = value at \$1 each.
	455.00 = value at 50 cts. each.
25 cts. = $\frac{1}{2}$ of 50 cts.	227.50 = value at 25 cts. each.
	<u>\$1592.50 = value at \$1.75 each.</u>
(4) 20 cts. = $\frac{1}{5}$ of \$1	\$876.00 = value at \$1 each.
	<u>2</u>
	\$1752.00 = value at \$2 each.
	175.20 = value at 20 cts. each.
	<u>\$1927.20 = value at \$2.20 each.</u>
(5) 25 cts. = $\frac{1}{4}$ of \$1	\$1075.00 = value at \$1 each.
	<u>3</u>
	\$3225.00 = value at \$3 each.
	268.75 = value at 25 cts. each.
	<u>\$3493.75 = value at \$3.25 each.</u>

(6) 50 cts. = $\frac{1}{2}$ of \$1	\$1278.00 = value at \$1 each.
25 cts. = $\frac{1}{2}$ of 50 cts.	639.00 = value at 50 cts. each.
12 $\frac{1}{2}$ cts. = $\frac{1}{2}$ of 25 cts.	319.50 = value at 25 cts. each.
	159.75 = value at 12 $\frac{1}{2}$ c. each.
	<u>\$2396.25</u> = value at \$1.87 $\frac{1}{2}$ each.

	£	s.	d.	
(7) 1s. = $\frac{1}{20}$ of £1	397	0	0	= value at £1.
	19	17	0	= value at 1s.
	<u>£416</u>	17	0	= value at £1 1s.

	£	s.	d.	
(8) 5s. = $\frac{1}{4}$ of £1	250	0	0	= value at £1 each.
		2		
2s. 6d. = $\frac{1}{2}$ of 5s.	500	0	0	= value at £2 each.
	62	10	0	= value at 5s. each.
6d. = $\frac{1}{5}$ of 2s. 6d.	31	5	0	= value at 2s. 6d. each.
	6	5	0	= value at 6d. each.
	<u>£600</u>	0	0	= value at £2 8s. each.

(9) 50 cts. = $\frac{1}{2}$ 1f. \$1	\$1324.00 = value at \$1 each.
	<u>3</u>
25 cts. = $\frac{1}{2}$ of 50 cts.	\$3972.00 = value at \$3 each.
	662.00 = value at 50 cts. each.
	331.00 = value at 25 cts. each.
	<u>\$4965.00</u> = value at \$3.75 each.

	£	s.	d.	
(10) 5s. = $\frac{1}{4}$ of £1	2678	0	0	= value at £1 each.
		2		
2s. 6d. = $\frac{1}{2}$ of 5s.	5356	0	0	= value at £2 each.
	669	10	0	= value at 5s. each.
	334	15	0	= value at 2s. 6d. ea.
	<u>£6360</u>	5	0	= val. at £2 7s. 6d. ea.

	£	s.	d.	
(11) 10s. = $\frac{1}{2}$ of £1	973	0	0	=value at £1 each.
5s. = $\frac{1}{2}$ of 10s.	486	10	0	=value at 10s. each.
1s. = $\frac{1}{5}$ of 5s.	243	5	0	=value at 5s. each.
6d. = $\frac{1}{2}$ of 1s.	48	13	0	=value at 1s. each.
2d. = $\frac{1}{3}$ of 6d.	24	6	6	=value at 6d. each.
$\frac{1}{2}$ d. = $\frac{1}{3}$ of 2d.	8	2	2	=value at 2d. each.
	2	0	6 $\frac{1}{2}$	=value at $\frac{1}{2}$ d. each.
	£812	17	2 $\frac{1}{2}$	=value at 16s. 8 $\frac{1}{2}$ d.

	£	s.	d.	
(12) 5s. = $\frac{1}{4}$ of £1	236	0	0	=value at £1 each.
			7	
10d. = $\frac{1}{6}$ of 5s.	1652	0	0	=value at £7 each.
1d. = $\frac{1}{10}$ of 10d.	59	0	0	=value at 5s. each.
	9	16	8	=value at 10d. each.
$\frac{1}{2}$ d. = $\frac{1}{2}$ of 1d.	19	8		=value at 1d. each.
	9	10		=value at $\frac{1}{2}$ d. each.
	£1722	6	2	=val. at £7 5s. 11 $\frac{1}{2}$ d.

	£	s.	d.	
(13) 10s. = $\frac{1}{2}$ of £1	9978	0	0	=value at £1 each.
			8	
3s. 4d. = $\frac{1}{3}$ of 10s.	79824	0	0	=value at £8 each.
4d. = $\frac{1}{10}$ of 3s. 4d.	4989	0	0	=value at 10s. each.
	1663	0	0	=val. at 3s. 4d. each.
$\frac{1}{2}$ = $\frac{1}{3}$ of 4d.	166	6	0	=value at 4d. each.
	20	15	9	=value at $\frac{1}{2}$ d. each.
	£86663	1	9	=value at £8 13s. 8 $\frac{1}{2}$ d.

	£	s.	d.	
(14) 10s. = $\frac{1}{2}$ of £1	15739	0	0	=val. at £1 each.
			9	
6s. 8d. = $\frac{1}{3}$ of £1	141651	0	0	=val. at £9 each.
1s. = $\frac{1}{10}$ of 10s.	7869	10	0	=val. at 10s. each.
1d. = $\frac{1}{12}$ of 1s.	5246	6	8	=val. at 6s. 8d. ea.
$\frac{1}{2}$ d. = $\frac{1}{2}$ of 1d.	786	19	0	=val. at 1s. each.
$\frac{1}{4}$ d. = $\frac{1}{2}$ of $\frac{1}{2}$ d.	65	11	7	=val. at 1d. each.
	32	15	9 $\frac{1}{2}$	=val. at $\frac{1}{2}$ d. each.
	16	7	10 $\frac{3}{4}$	=val. at $\frac{1}{4}$ d. each.
	£155668	10	11 $\frac{1}{4}$	=val. at £9 17s. 9 $\frac{3}{4}$ d.

(15) 50 cts. = $\frac{1}{2}$ of \$1	\$27835.00 = value at \$1 each. 9
12 $\frac{1}{2}$ cts. = $\frac{1}{4}$ of 50 cts.	\$250515 00 = value at \$9 each. 13917 50 = val. at 50 cts. each. 3479 37 $\frac{1}{2}$ = val. at 12 $\frac{1}{2}$ c. each. \$267911.87 $\frac{1}{2}$ = val. at \$9.62 $\frac{1}{2}$ each.
(16) 50 cts. = $\frac{1}{2}$ of \$1	\$37832 00 = value at \$1 each. 18
20 cts. = $\frac{1}{5}$ of \$1	\$680976.00 = value at \$18 each. 18916 00 = val. at 50 cts. each.
20 cts. = $\frac{1}{5}$ of \$1	7566.40 = val. at 20 cts. each. 7566.40 = val. at 20 cts. each. \$715024.80 = val. at \$18.90 each.
(17) 20 cts. = $\frac{1}{5}$ of \$1	\$250215 00 = value at \$1 50043.00 = value at 20 cts.
5 cts. = $\frac{1}{4}$ of 20 cts.	12510 75 = value at 5 cts.
4 cts. = $\frac{1}{5}$ of 20 cts.	10008.60 = value at 4 cts. \$72562.35 = value at 29 cts.
(18) 50 cts. = $\frac{1}{2}$ of \$1	\$12815.00 = value at \$1. 6407.50 = value at 50 cts.
25 cts. = $\frac{1}{2}$ of 50 cts.	3203.75 = value at 25 cts. \$9611.25 = value at 75 cts. £ s. d.
(19) 10s. = $\frac{1}{2}$ of £1	4970 0 0 = value at £1.
1s. = $\frac{1}{10}$ of 10s.	2485 0 0 = value at 10s.
1d. = $\frac{1}{12}$ of 1s.	248 10 0 = value at 1s.
$\frac{1}{2}$ d. = $\frac{1}{2}$ of 1d.	20 14 2 = value at 1d. 10 7 1 = value at $\frac{1}{2}$ d. £2764 11 3 = value at 11s. $11\frac{1}{2}$ d. d.
(20) $\frac{1}{2}$ d. = $\frac{1}{2}$ of 1d.	83 = value at 1d. per yd. 11
	£3 16 1 = value at 11d. per yd. 3 5 $\frac{1}{2}$ = value at $\frac{1}{2}$ d. per yd.
$\frac{1}{2}$ of 11 $\frac{1}{2}$ =	3 19 6 $\frac{1}{2}$ = value at 11 $\frac{1}{2}$ d. per yd. 5 $\frac{1}{4}$
	£4 0 0 $\frac{1}{4}$ = value of 83 $\frac{1}{2}$ yds.

6d. = $\frac{1}{2}$ of 1s.	£	s.	d.	
	2	17	0	=value at 1s. per yd.
4d. = $\frac{1}{3}$ of 1s.	1	8	6	=value at 6d. per yd.
	19	0		=value at 4d. per yd.
$\frac{3}{4}$ of 1s. 10d. =	5	4	6	=value at 1s. 10d. per yd.
	1	4 $\frac{1}{2}$		
	£5	5	10 $\frac{1}{2}$	=value of 57 $\frac{1}{2}$ yds.
$\frac{3}{4}$ d. = $\frac{1}{12}$ of 9d.	s.	d.		
	9	10		=value at 1d. per yd.
		9		
	4	8	6	=value at 9d. per yd.
	7	4 $\frac{1}{2}$		=value at $\frac{3}{4}$ d. per yd.
	£4	15	10 $\frac{1}{2}$	=value at 8 $\frac{3}{4}$ d. per yd.
	£	s.	d.	
	4	0	0 $\frac{1}{4}$	
	5	5	10 $\frac{1}{2}$	
	4	15	10 $\frac{1}{2}$	
	£14	1	9 $\frac{1}{4}$	= total amount.

EX. LXIX. (p. 126.)

(1) 20 lbs. = $\frac{1}{5}$ of 1 bus.	\$1.20 = value of 1 bushel.
	55
	\$66.00 = value of 55 bushels.
	40 = value of 20 lbs.
5 lbs. = $\frac{1}{4}$ of 20 lbs.]	10 = value of 5 lbs.
	\$66.50 = value of 55 b. 25 lbs.
(2) 2 qrs. = $\frac{1}{2}$ of 1 cwt.	10 cts. = value of 1 lb.,
	\therefore \$10.00 = value of 1 cwt.
	16
	\$160.00 = value of 16 cwt.
10 lbs. = $\frac{1}{6}$ of 2 qrs.	5.00 = value of 2 qrs.
10 lbs. = $\frac{1}{3}$ of 2 qrs.	1.00 = value of 10 lbs.
	1.00 = value of 10 lbs.
	\$167.00 = value of 16 cwt.
	2 qrs. 20 lbs.

(3) 2 ro. = $\frac{1}{2}$ of 1 ac.	\$15.50	= value of 1 ac.
	8	
	<hr/>	
	\$124.00	= value of 8 ac.
	12	
	<hr/>	
	\$1488.00	= value of 96 ac.
10 per. = $\frac{1}{3}$ of 2 ro.	7.75	= value of 2 ro.
	96875	= value of 10 per.
	<hr/>	
	\$1496.71875	= val. of 96 ac. 2 ro. 10 per.

	s. d.	
(4) 10 dwt. = $\frac{1}{2}$ of 1 oz.	7 1	= value of 1 oz.
	32	
	<hr/>	
2 dwt. = $\frac{1}{5}$ of 10 dwt.	£11 6 8	= val. of 2 lbs. 8 oz.
1 dwt. = $\frac{1}{2}$ of 2 dwt.	3 6 $\frac{1}{2}$	= value of 10 dwt.
	8 $\frac{1}{2}$	= value of 2 dwt.
	4 $\frac{1}{4}$	= value of 1 dwt.
	<hr/>	
	£11 11 3 $\frac{1}{4}$	= val. of 2 lbs. 8 oz. 13 dwt.

	s. d.	
(5) 1 ft. 6 in. = $\frac{1}{2}$ of 1 yd.	12 6	= value of 1 yd.
1 foot = $\frac{1}{3}$ of 1 yard.	15	
	<hr/>	
1 inch = $\frac{1}{12}$ of 1 foot.	£9 7 6	= value of 15 yds.
	6 3	= val. of 1 ft. 6 in.
	4 2	= value of 1 ft.
	4 $\frac{1}{6}$	= value of 1 in.
	<hr/>	
	£9 18 3 $\frac{1}{6}$	= value of 15 yds. 2 ft. 7 in.

	£	s. d.	
(6) 72 in. = $\frac{1}{2}$ of 1 s. ft.	1	7 0	= value of 1 s. ft.
		259	
	<hr/>		
	£349	13 0	= value of 259 s. ft. or 28 s. yds. 7 s. ft.
36 inches = $\frac{1}{2}$ of 72 in.		13 6	= value of 72 in.
2 inches = $\frac{1}{36}$ of 36 in.		6 9	= value of 36 in.
		4 $\frac{1}{2}$	= value of 2 in.
	<hr/>		
	£350	13 7 $\frac{1}{2}$	= val. of 28 s. yds. 7 s. ft. 110 in.

(7) 2 fur. = $\frac{1}{4}$ of 1 mi.	\$11000.00 = value of 1 mile.
	11
1 fur. = $\frac{1}{2}$ of 2 fur.	\$121000.00 = value of 11 mi.
	2750.00 = value of 2 fur.
	1375.00 = value of 1 fur.
55 yards = $\frac{1}{32}$ of 1 mi.	343.75 = value of 55 yds.
	\$125468.75 = value of 11 miles
	3 fur. 55 yds.

(8) $57\frac{1}{2}$ lbs. $\times 2 = 115$ lbs.
 $73\frac{3}{4}$ lbs. $\times 3 = 221\frac{1}{4}$ lbs.

$336\frac{1}{4}$ lbs. = 3 cwt. $36\frac{1}{4}$ lbs.

25 lbs. = $\frac{1}{4}$ of 1 cwt.	\$25.00 = value of 1 cwt.
	3
	\$75.00 = value of 3 cwt.
10 lbs. = $\frac{1}{10}$ of 1 cwt.	6.25 = value of 25 lbs.
1 lb. = $\frac{1}{10}$ of 10 lbs.	2.50 = value of 10 lbs.
$\frac{1}{4}$ lb. = $\frac{1}{4}$ of 1 lb.	.25 = value of 1 lb.
	.06 $\frac{1}{4}$ = value of $\frac{1}{4}$ lb.
	\$84.06 $\frac{1}{4}$ = value of 3 cwt. $36\frac{1}{4}$ lbs.

(9) 50 ft. = $\frac{1}{2}$ of 100 ft.	\$5.00 = value per 100 feet.
	34
	\$170.00 = value of 3400 feet.
10 feet = $\frac{1}{5}$ of 50 feet.	2.50 = value of 50 feet.
	.50 = value of 10 feet.
	\$173.00 = value of 3460 feet.

(10) 500 = $\frac{1}{2}$ of 1000	\$4.00 = value per 1000 bricks.
	24
	\$96.00 = value of 24000.
100 = $\frac{1}{5}$ of 500	2.00 = value of 500.
50 = $\frac{1}{2}$ of 100	.40 = value of 100.
	.20 = value of 50.
	\$98.60 = value of 24650.

(11) $500 = \frac{1}{2}$ of 1000	\$10.25	=value per 1000 ft.
	46	
	<hr/>	
$50 = \frac{1}{10}$ of 500.	\$471.50	=value of 46000 ft.
$25 = \frac{1}{2}$ of 50.	5.125	=value of 500 feet.
$10 = \frac{1}{5}$ of 50.	.5125	=value of 50 feet.
$5 = \frac{1}{2}$ of 10.	.25625	=value of 25 feet.
	.1025	=value of 10 feet.
	.05125	=value of 5 feet.
	<hr/>	
	\$477.54750	=value of 46590 ft.

(12)	$19\frac{1}{2}$ cts.=value of 1 yard.
	17

$\frac{5}{8}$ of $19\frac{1}{2}$ cts.=	<hr/>	\$3.31 $\frac{1}{2}$ =value of 17 yards.
	12 $\frac{3}{16}$	

	<hr/>	\$3.43 $\frac{1}{16}$ =value of 17 $\frac{1}{2}$ yards.
--	-------	---

	$55\frac{1}{2}$ cts.=value of 1 yard.
	35

$\frac{9}{16}$ of $55\frac{1}{2}$ =	<hr/>	\$19.42 $\frac{1}{2}$ =value of 35 yards.
	31 $\frac{7}{8}$	

	<hr/>	\$19.73 $\frac{3}{8}$ =value of 35 $\frac{9}{16}$ yards.
--	-------	--

	$70\frac{1}{2}$ cts.=value of 1 yard.
	96

$\frac{8}{11}$ of $70\frac{1}{2}$ cts.=	<hr/>	\$67.68=value of 96 yards.
	51 $\frac{3}{11}$	

	<hr/>	\$68.19 $\frac{3}{11}$ =value of 96 $\frac{8}{11}$ yards.
--	-------	---

	$32\frac{1}{2}$ cts.=value 1 yard.
	104

$\frac{5}{6}$ of $32\frac{1}{2}$ cts.=	<hr/>	\$33.80=value of 104 yards.
	27 $\frac{1}{2}$	

	<hr/>	\$34.07 $\frac{1}{2}$ =value of 104 $\frac{5}{6}$ yards.
--	-------	--

$$17\frac{1}{4} \text{ cts.} = \text{value of 1 yard.}$$

$$\frac{8}{3} \text{ of } 17\frac{1}{4} \text{ cts.} = \begin{array}{r} \$2.07 = \text{value of 12 yards.} \\ .06\frac{1}{2} \end{array}$$

$$\$2.13\frac{1}{2} = \text{value of } 12\frac{2}{3} \text{ yards.}$$

$$\begin{array}{r} \$ 3.43\frac{1}{6} \\ 19.73\frac{3}{2} \\ 68.19\frac{3}{11} \\ 34.07\frac{1}{2} \\ 2.13\frac{1}{2} \end{array}$$

$$\$127.57\frac{61}{24} = \text{total amount.}$$

$$(13) \quad 12\frac{1}{2} \text{ cts.} = \text{value of 1 pound.}$$

$$\frac{1}{3} \text{ of } 12\frac{1}{2} = \begin{array}{r} \$3.12\frac{1}{2} = \text{value of 25 lbs.} \\ 10\frac{5}{6} \end{array}$$

$$\$3.23\frac{1}{3} = \text{value of } 25\frac{1}{3} \text{ lbs.}$$

$$11 \text{ cts.} = \text{value of 1 pound.}$$

$$\frac{1}{2} \text{ of } 11 = \begin{array}{r} \$2.09 = \text{value of 19 lbs.} \\ 10\frac{1}{2} \end{array}$$

$$\$2.19\frac{1}{2} = \text{value of } 19\frac{1}{2} \text{ lbs.}$$

$$8\frac{1}{2} \text{ cts.} = \text{value of 1 pound.}$$

$$\frac{7}{8} \text{ of } 8\frac{1}{2} = \begin{array}{r} \$2.97\frac{1}{2} = \text{value of 35 lbs.} \\ .07\frac{7}{8} \end{array}$$

$$\$3.04\frac{1}{6} = \text{value of } 35\frac{1}{3} \text{ lbs.}$$

$$\frac{6\frac{1}{2}}{17} \text{ cts.} = \text{value of 1 pound.}$$

$$\frac{1}{2} \text{ of } 6\frac{1}{2} = \begin{array}{r} \$1.10\frac{1}{2} \\ .03\frac{1}{4} \end{array} = \text{value of 17 lbs.}$$

$$\begin{array}{r} \$1.13\frac{3}{4} \\ \$3.23\frac{1}{2} \\ 2.19\frac{1}{2} \\ 3.04\frac{1}{2} \\ 1.13\frac{3}{4} \end{array} = \text{value of } 17\frac{1}{2} \text{ lbs.}$$

$$(14) \quad \begin{array}{r} \$9.61\frac{5}{8} \\ 12\frac{1}{2} \text{ cts.} \\ 17 \end{array} = \text{total amount.}$$

$$\frac{8}{9} \text{ of } 12\frac{1}{2} = \begin{array}{r} \$2.12\frac{1}{2} \\ .11\frac{1}{9} \end{array} = \text{value of 17 lbs.}$$

$$\begin{array}{r} \$2.23\frac{1}{8} \\ 17\frac{1}{2} \text{ cts.} \\ 18 \end{array} = \text{value of } 17\frac{8}{9} \text{ lbs.}$$

$$\frac{3}{4} \text{ of } 17\frac{1}{2} = \begin{array}{r} \$3.15 \\ .13\frac{1}{5} \end{array} = \text{value of 18 lbs.}$$

$$\begin{array}{r} \$3.28\frac{1}{5} \\ 75 \text{ cts.} \\ 5 \end{array} = \text{value of } 18\frac{1}{5} \text{ lbs.}$$

$$\frac{5}{16} \text{ of } 75 = \begin{array}{r} \$3.75 \\ .20\frac{5}{6} \end{array} = \text{value of 5 pound.}$$

$$\begin{array}{r} \$3.95\frac{5}{6} \\ 40 \text{ cts.} \\ 10 \end{array} = \text{value of } 5\frac{5}{6} \text{ lbs.}$$

$$\frac{2}{5} \text{ of } 40 = \begin{array}{r} \$4.00 \\ .28\frac{1}{7} \end{array} = \text{value of 10 lbs.}$$

$$\begin{array}{r} \$4.28\frac{1}{7} \end{array} = \text{value of } 10\frac{2}{7} \text{ lbs.}$$

25 cts. = value 1 pound.

7 $\frac{1}{2}$ of 25 =\$1.75 = value of 7 lbs..18 $\frac{1}{4}$ \$1.93 $\frac{1}{4}$ = value of 7 $\frac{3}{4}$ lbs.\$2.23 $\frac{11}{16}$ 3.28 $\frac{1}{2}$ 3.95 $\frac{5}{8}$ 4.28 $\frac{1}{2}$ 1.93 $\frac{1}{4}$ \$15.69 $\frac{119}{104}$ = total amount.

Ex. LXX. (p. 128.)

(1) \$217.25

8

\$17.3800 = int.

\$17.38 + \$217.25 = \$234.63
= amount.(3) \$527.37 $\frac{1}{2}$ 7

\$36.91625

3

\$110.74875 = int.

\$527.37 $\frac{1}{2}$ + \$110.74875 =
\$638.12375 = amount.

(4) \$93.50

6

\$5.6100

2

\$11.22 = int.

\$93.50 + \$11.22 = \$104.72
= amount.

(2) \$217.25

8

\$17.3800

2

\$34.76 = int.

\$217.25 + \$34.76 =
\$252.01 = amt.

(5) \$75.75

7

\$5.3025

5 $\frac{1}{2}$

\$10.6050

2.65125

\$13.25625 = int.

\$75.75 + \$13.25625 =
\$89.00625 = amt.

$$\begin{array}{r}
 \text{(6)} \quad \begin{array}{r} \text{£} \quad \text{s.} \quad \text{d.} \\ 62 \quad 18 \quad 9\frac{1}{2} \\ \hline \phantom{9\frac{1}{2}} 8 \\ \hline 503 \quad 10 \quad 4 \\ 3\frac{1}{2} \\ \hline 1510 \quad 11 \quad 0 \\ 251 \quad 15 \quad 2 \\ \hline \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{£}1762 \quad 7 \quad 2 \\
 20 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 12\cdot47\text{s.} \\
 12 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 5\cdot66\text{d.} \\
 4 \\
 \hline
 \end{array}$$

$$2\cdot64\text{q.}$$

$$\begin{array}{l}
 \text{£}17 \ 12\text{s.} \ 5\frac{1}{2}\text{d.} = \text{interest.} \\
 \text{£}62 \ 18\text{s.} \ 9\frac{1}{2}\text{d.} + \text{£}17 \ 12\text{s.} \ 5\frac{1}{2}\text{d.} \\
 = \text{£}80 \ 11\text{s.} \ 3\text{d.} = \text{amt.}
 \end{array}$$

$$\begin{array}{r}
 \text{(9)} \quad \text{£}7500 \\
 3\frac{1}{2} \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 22500 \\
 937\cdot5 \\
 \hline
 \end{array}$$

$$\text{£}234\cdot375$$

$$\begin{array}{r}
 \text{£}234\cdot375 \\
 174 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 937500 \\
 1640625 \\
 234375 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 \text{(7)} \quad \$1075\cdot75 \\
 8 \\
 \hline
 \$86\cdot0600 \\
 4\frac{1}{2} \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 \$344\cdot24 \\
 21\cdot515 \\
 \hline
 \end{array}$$

$$\$365\cdot755 = \text{int.}$$

$$\begin{array}{l}
 \$1075\cdot75 + \$365\cdot755 = \\
 \$1441\cdot505 = \text{amt.}
 \end{array}$$

$$\begin{array}{r}
 \text{(8)} \quad \$684\cdot00 \\
 8 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 \$54\cdot7200 \\
 5 \\
 \hline
 \end{array}$$

$$\$273\cdot60$$

$$\begin{array}{l}
 12 : 8 :: \$54\cdot72 : \text{int. for 8} \\
 \text{mos. ; } \$ \frac{54\cdot72 \times 8}{12} = \$36\cdot48.
 \end{array}$$

$$\begin{array}{l}
 \$273\cdot60 + \$36\cdot48 = \$310\cdot08 \\
 = \text{interest.}
 \end{array}$$

$$\begin{array}{l}
 \$684\cdot00 + \$310\cdot08 = \\
 \$994\cdot08 = \text{amount.}
 \end{array}$$

$$\begin{array}{l}
 \text{No. of days from May 5th} \\
 \text{to October 26th} = 174.
 \end{array}$$

$$365 : 174 :: \text{£}234\cdot375 : \text{interest reqd.} \therefore \text{Int. reqd.}$$

$$= \text{£} \frac{234\cdot375 \times 174}{365};$$

$$\begin{array}{l}
 \text{£}40781\cdot250, \text{ or } \text{£}40781 \ 5\text{s.} ; \\
 (\text{Continued on next page.})
 \end{array}$$

£ s. d.
365 (40781 5 (111 14 7 $\frac{5}{3}$ = interest.

365

428

365

631

365

266

20

5325

365

1675

(10) £ s. d.
4865 11 5
5 $\frac{2}{3}$

24327 17 1
1824 11 9 $\frac{2}{3}$

£7500 + £111 14s. 7 $\frac{5}{3}$ d. =
£7611 14s. 7 $\frac{5}{3}$ d. = amt.

1675

1460

215

12

2580

2555

$\frac{25}{365} = \frac{5}{73}$

26152 8 10 $\frac{2}{3}$ ÷ 100 = £261 10s. 5·86375d.;

Number of days from Jan. 1st to Aug. 28th, 1868 =
240. 366 : 240 :: £261 10s. 5·86375d. : interest req^d.

∴ Interest req^d. = £ $\frac{261 \text{ 10s. } 5·86375\text{d} \times 240}{366}$ = £171 9s.

9·94d. Amount = £4865 11s. 5d. + £171 9s. 9·94d. =
£5037 1s. 2·94d.

(11) Interest = amt. — principal = \$994.56 — \$672.00
= \$322.56. Interest on \$672.00 at 8 per cent. for one
year = \$53.76.

Hence, \$53.76 : \$322.56 :: 1 year : time required.

∴ Time required = $\frac{32256 \times 1}{5376}$ years = 6 years.

(12) \$816 : 100 :: $\frac{1}{6}$ of \$346.80 : rate required.

∴ Rate required = $\frac{69·36 \times 100}{816} = 8\frac{1}{2}$.

(13) £100 will amount in 15 months at 5 per. cent. to £106 5s. Hence, £106 5s. : £133 2s. 6d. (given amt.)
 \therefore £100 : sum required.

$$\therefore \text{Sum required} = \frac{100 \times 33150}{25500} = £130.$$

	£	fl.	c.	m.
(14)	578	3	1	2½
				2½
	1156	6	2	50
	289	1	5	625
	14·45	7	8	125
				2½
	28·91	5	6	250
	3·61	4	4	53125

$$£32·53 \ 0 \ 0 \ 78125 = £32 \ 5\text{fl.} \ 3\text{c.} \ 0·078125\text{m.}$$

(15) \$2293.75 : \$100 \therefore $\frac{1}{2}\%$ of \$2293.75 : rate reqd.

$$\therefore \text{Rate required} = \frac{91·75 \times 100}{2293·75} = 4.$$

Ex. LXXI. (p. 130.)

$$(2) \quad \begin{array}{r} \$742 \\ 8 \end{array}$$

$$\begin{array}{l} \$59.36 = \text{int. for 1st yr.} \\ \therefore \$801.36 = 2^{\text{nd}} \text{ principal.} \end{array}$$

$$(1) \quad \begin{array}{r} \$800 \\ 7 \end{array}$$

$$\begin{array}{l} \$56.00 = \text{int. for 1st yr.} \\ \therefore \$856.00 = 2^{\text{nd}} \text{ principal.} \end{array}$$

$$\begin{array}{l} \$59.92 = \text{int. for 2nd yr.} \\ \therefore \text{Comp. int.} = \$56.00 + \$59.92 = \$115.92. \text{ Amt.} = \$800 + \$115.92 = \$915.92. \end{array}$$

$$\begin{array}{l} \$64.1088 = \text{int. for 2nd yr.} \\ \therefore \$865.4688 = 3^{\text{rd}} \text{ principal.} \\ \$69.237504 = \text{int. for 3rd yr.} \\ \therefore \text{Comp. int.} = \$59.36 + \$64.1088 + \$69.237504 = \\ \$192.70 +. \text{ Amt.} = \$742 + \\ \$192.70 + = \$934.70 +. \end{array}$$

$$(3) \begin{array}{r} \$560 \\ 10 \\ \hline \end{array}$$

 $\$56.00 = \text{int. for 1}^{\text{st}} \text{ yr.}$

$$\therefore \$616.00 = 2^{\text{nd}} \text{ principal.}$$

$$\begin{array}{r} 10 \\ \hline \end{array}$$

 $\$61.60 = \text{int. for } 2^{\text{nd}} \text{ yr.}$

$$\therefore \$677.60 = 3^{\text{rd}} \text{ principal.}$$

$$\begin{array}{r} 10 \\ \hline \end{array}$$

 $\$67.76 = \text{int. for } 3^{\text{rd}} \text{ yr.}$

$$\therefore \$745.36 = 4^{\text{th}} \text{ prinl.}$$

$$\begin{array}{r} 10 \\ \hline \end{array}$$

 $\$74.536 = \text{int. for } 4^{\text{th}} \text{ yr.}$

$$\therefore \$819.896 = 5^{\text{th}} \text{ principal.}$$

$$\begin{array}{r} 10 \\ \hline \end{array}$$

 $\$81.9896 = \text{int. for } 5^{\text{th}} \text{ year.}$
 $\$81.9896$
 $\$74.536$
 $\$67.76$
 $\$61.60$
 $\$56.00$
 $\$341.8856 = \text{comp. int.,}$
 $\text{or } \$341.88 + . \text{ Am}^t. = \341.88
 $+ \$560 = \$901.88 + .$

(4)

 $1^{\text{st}} \text{ pay't of int.} = \$308.$

$$\times \frac{1\frac{1}{2}}{100} = \$4.62$$

 $2^{\text{nd}} \text{ pay't of int.} = \312.62

$$\times \frac{1\frac{1}{2}}{100} = \$4.6893$$

 $3^{\text{rd}} \text{ pay't of int.} = \317.3093

$$\times \frac{1\frac{1}{2}}{100} = \$4.7596395$$

 $4^{\text{th}} \text{ pay't of int.} = \322.1689395

$$\times \frac{1\frac{1}{2}}{100} = \$4.8335340925$$

 $5^{\text{th}} \text{ pay't of int.} = \327.0024735925

$$\times \frac{1\frac{1}{2}}{100} = \$4.9050371088875$$

 $6^{\text{th}} \text{ pay't of int.} = \$331.9075107013875 \times \frac{1\frac{1}{2}}{100} = \4.9786126605208125
 $\therefore \text{Comp. interest} = \28.7861233619083125
 $\text{or, } \$28.78 + .$
 $\therefore \text{Amount} = \$308.00 + \$28.78 + = \$336.78 + .$

$$\begin{array}{rcl}
 & (5) & \\
 \text{1st pay't of interest} & = \$610. & \times \frac{4}{100} = \$24.40 \\
 \text{2d pay't of interest} & = \$634.40 & \times \frac{4}{100} = \$25.376 \\
 \text{3d pay't of interest} & = \$659.776 & \times \frac{4}{100} = \$26.39104 \\
 \text{4th pay't of interest} & = \$686.16704 & \times \frac{4}{100} = \$27.446816 \\
 \hline
 \therefore \text{Comp. interest} & = & \$103.6137216 \\
 & & \$610.00 \\
 \hline
 \end{array}$$

$$\text{Amount} = \$713.61+.$$

$$\begin{array}{rcl}
 & (6) & \\
 \text{1st pay't of int.} & = \$1000. & \times \frac{3\frac{1}{2}}{100} = \$35. \\
 \text{2d pay't of int.} & = \$1035. & \times \frac{3\frac{1}{2}}{100} = \$36.225 \\
 \text{3d pay't of int.} & = \$1071.225 & \times \frac{3\frac{1}{2}}{100} = \$37.492875 \\
 \text{4th pay't of int.} & = \$1108.717875 & \times \frac{3\frac{1}{2}}{100} = \$38.805125625 \\
 \text{5th pay't of int.} & = \$1147.523000625 & \times \frac{3\frac{1}{2}}{100} = \$40.163305021875 \\
 \text{6th pay't of int.} & = \$1187.68630584375 & \times \frac{3\frac{1}{2}}{100} = \$41.56902070453125 \\
 \hline
 \therefore \text{Comp. interest} & = & \$229.25532635140625 \\
 & \text{or, } \$229.25 +. &
 \end{array}$$

$$\text{Amount} = \$1000 + 229.25 \dots = \$1229.25\dots$$

$$\begin{array}{rcl}
 & (7) & \\
 & & \text{£62.678} \\
 & & \text{£61.60} \\
 \hline
 (1) \quad \text{£880} & & \text{£1.078} \\
 \quad 3\frac{1}{2} & & 20 \\
 \hline
 \quad 2640 & & \text{1.560s.} \\
 \quad 440 & & 12 \\
 \hline
 \text{£30.80} & & \text{6.72d.} \\
 \quad 2 & & 4 \\
 \hline
 \text{£61.60} & = \text{simple int.} & \text{2.88q.} \\
 & & \text{£1 1s. 6}\frac{1}{2}\text{d. 88q.}
 \end{array}$$

(Continued on next page.)

(7 continued.)

(1) £880

3½

£30·8 = int. for 1st yr.

∴ £910·8 = 2d principal.

3½£31·878 = int. for 2nd yr.£30·8 + £31·878 = comp. int.
= £62·678.

(2) £178·7116

171·75

£6·9616

20

19·232s.

12

2·784d.

4

3·136q.

£6 19s. 2¾d. 136q.

(2) £1431·25

4

£57·2500

3

£171·75 = simp. int.

£1431·25

4

£57·25 = int. for 1st yr.

∴ £1488·5 = 2d principal.

4

£59·54 = int. for 2d yr.

∴ £1548·04 = 3d principal.

4

£61·9216 = int. for 3d yr.

£59·54

£57·25

£178·7116 = comp. interest.

Ex. LXXII. (p. 133.)

(1) \$108 : \$216 :: \$100 : present worth.

∴ Present worth = \$ $\frac{100 \times 216}{108}$ = \$200.

(2) \$121 : \$968 :: \$100 : present worth.

∴ Present worth = \$ $\frac{100 \times 968}{121}$ = \$800.

(3) \$103 : \$1236 :: \$100 : present worth.

∴ Present worth = \$ $\frac{100 \times 1236}{103}$ = \$1200.

(4) \$107.50 : \$225.25 :: \$100 : present worth.

$$\therefore \text{Present worth} = \$ \frac{100 \times 225.25}{107.50} = \$209.53+.$$

(5) \$117.50 : \$1057.50 : \$100 : present worth.

$$\therefore \text{Present worth} = \$ \frac{100 \times 1057.50}{117.50} = \$900.$$

(6) £125 : £161 13s. 5½d. :: £100 : present worth.

$$\therefore \text{Present worth} = £ \frac{100 \times 155205}{120000} = £129 \text{ 6s. 9d.}$$

(7) £107 18s. 4d. : £193 17s. 4½d. :: £100 : present worth.

$$\therefore \text{Present worth} = £ \frac{100 \times 186113}{103600} = £179 \text{ 12s. } 10\frac{1}{4}\text{d.}$$

$$\frac{2}{3}\frac{2}{3}\frac{2}{3}\text{q.}$$

(8) £100 8s. 5¾d. : £458 8s. 9½d. :: £100 : present worth.

$$\therefore \text{Present worth} = £ \frac{100 \times \frac{440101}{4}}{\frac{1759440}{73}} = £ \frac{440101 \times 100 \times 73}{4 \times 1759440}$$

$$= £456 \text{ 9s. } 11\frac{1}{4}\text{d. } \frac{71}{3}\frac{2}{3}\frac{1}{3}\text{q.}$$

(9) \$124 : \$217 :: \$24 : discount.

$$\therefore \text{Discount} = \$ \frac{217 \times 24}{124} = \$42.$$

(10) \$110.50 : \$221 :: \$10.50 : discount.

$$\therefore \text{Discount} = \$ \frac{1050 \times 221}{11050} = \$2100.$$

(11) \$105 : \$2000 :: \$5 : discount.

$$\therefore \text{Discount} = \$ \frac{5 \times 2000}{105} = \$95.23\frac{1}{2}\text{f.}$$

(12) \$106 : \$1750 :: \$6 : discount.

$$\therefore \text{Discount} = \$ \frac{6 \times 1750}{106} = \$99.05\frac{3}{5}\text{f.}$$

(13) £100 18s. 10 $\frac{1}{3}$ d. : £345 16s. 3d. :: 18s. 10 $\frac{1}{3}$ d.
: discount.

$$\therefore \text{Dis't} = \frac{16512 \times 6058635}{1168512} \text{d.} = \frac{16512 \times 6058635 \times 73}{73 \times 73 \times 1768512} \text{d.} = 2137572 \text{d.} = £3 \text{ 4s. } 6\frac{1}{2} \text{d. } \frac{539}{9211} \text{q.}$$

(14) £100 $\frac{2}{3}$: £549 :: £ $\frac{2}{3}$: discount.

$$\therefore \text{Discount} = £ \frac{40077 \times 32}{7332 \times 73 \times 73} = £2 \text{ 7s. } 11 \text{d. } \frac{140}{611} \text{q.}$$

Also, £100 : £549 :: £ $\frac{2}{3}$: interest on £549.

$$\therefore \text{Interest} = £ \frac{549 \times 32}{100 \times 73} = £2 \text{ 8s. } 1\frac{1}{2} \text{d. } \frac{114}{365} \text{q.}$$

$$£2 \text{ 8s. } 1\frac{1}{2} \text{d. } \frac{114}{365} \text{q.} - £2 \text{ 7s. } 11 \text{d. } \frac{140}{611} \text{q.} = 2\frac{1}{2} \text{d. } \frac{18554}{223015} \text{q.}$$

(15) £100 $\frac{4}{5}$: £450 :: £ $\frac{4}{5}$: discount.

$$\therefore \text{Discount} = £ \frac{32850 \times 45}{7345 \times 73 \times 73} = £2 \text{ 15s. } 1\frac{81}{1469} \text{d.}$$

Also, £100 : £450 :: £ $\frac{4}{5}$: interest.

$$\therefore \text{Interest} = £ \frac{450 \times 45}{100 \times 73} = £2 \text{ 15s. } 5\frac{5}{73} \text{d.}$$

$$£2 \text{ 15s. } 5\frac{5}{73} \text{d.} - £2 \text{ 15s. } 1\frac{81}{1469} \text{d.} = 4\frac{8452}{107237} \text{d.}$$

(16) In 18 months the tradesman allows 5s. or 3s. 4d. per year on £3 6s. 8d., that is $\frac{1}{20}$ of the whole.

Then $1 : \frac{1}{20} :: 100 : \text{rate of discount.} \therefore \text{Rate} = \frac{100 \times 1}{1 \times 20} = 5 \text{ per cent.}$

EX. LXXIII. (p. 137.)

(1) \$126.50 : \$527.25 :: \$100 : amount required.

$$\therefore \text{Amount req'd.} = \$ \frac{52725 \times 100}{12650} = \$416.79+.$$

(2) \$102.50 : \$800 :: \$100 : amount required.

$$\therefore \text{Amount required} = \$ \frac{800 \times 100}{102.50} = \$780.48\frac{2}{3}.$$

(3) \$100 : \$1556 :: \$98 : required value.

$$\therefore \text{Value} = \$ \frac{98 \times 1556}{100} = \$1524.88.$$

(4) \$99 : \$525.50 :: \$7 : required income.

$$\therefore \text{Required income} = \$ \frac{525.50 \times 7}{99} = \$37.15\frac{5}{9}.$$

(5) \$7\frac{1}{2} : \$900 :: \$125\frac{3}{4} : income required.

$$\therefore \text{Income} = \$ \frac{5023 \times 900 \times 2}{15 \times 40} = \$15069.$$

(6) \$100 : \$2140 :: \$65 : amount required.

$$\therefore \text{Amount required} = \$ \frac{65 \times 2140}{100} = \$1391.$$

(7) (1) £90\frac{7}{8} : £666 8s. 3d. :: £3 : gross income.

$$\therefore \text{Income} = £ \frac{666 \text{ 8s. 3d.} \times 3}{90\frac{7}{8}} = £22.$$

Income tax = (22 × 4)d. = 88d. = 7s. 4d. Net income = £22 - 7s. 4d. = £21 12s. 8d. Half-yearly gain = £21 12s. 8d. ÷ 2 = £10 16s. 4d.

(2) Income tax on £100 = (100 × 4)d. = 400d. = £1 13s. 4d.;
 \therefore £100 income would yield £100 - £1 13s. 4d. = £98 6s. 8d., or £98\frac{1}{2}. Hence, £90\frac{7}{8} : £98\frac{1}{2} :: £3 : req^d. rate.

$$\therefore \text{Req^d. rate} = £ \frac{3 \times 98\frac{1}{2}}{90\frac{7}{8}} = £ \frac{3 \times 295 \times 8}{3 \times 727} = £3 \text{ 4s. } 11\frac{67}{27}\text{d.}$$

(8) £136 : £100 :: £8 : required rate.

$$\therefore \text{Rate required} = \frac{8 \times 100}{136} = 5.88 + \text{ or nearly 6 per ct.}$$

(9) £136 : £100 :: £8 : Int. received from B of Montreal.

$$\therefore \text{Rate of Interest} = \frac{100 \times 8}{136} = 5.88 +$$

£104 : £100 :: £7.5 : Int. received from B of Toronto.

$$\therefore \text{Rate of Interest} = \frac{7.5 \times 100}{104} = 7.21 +$$

Therefore the Bank of Toronto is the better investment.

(10) £93 : £4650 :: £100 : quantity of 3 per cent. stock bought.

$$\therefore \text{Quantity of stock bought} = \frac{£4650 \times 100}{93} = £5000.$$

The stock stood at 93: now having fallen $\frac{1}{2}$ per cent., it stands at 92 $\frac{1}{2}$.

$$\therefore 100 : 5000 :: £92\frac{1}{2} : \text{value of stock.}$$

$$\therefore \text{Value of stock} = \frac{£5000 \times 92\frac{1}{2}}{100} = £4625$$

$$\therefore \text{Loss of property} = £4650 - £4625 = £25.$$

(11) £90 $\frac{5}{8}$: £99 :: £29000 : quantity of 3 per cent. stock.

$$\therefore \text{Quantity of 3 per cent stock} = \frac{£29000 \times 99 \times 8}{725} = £31680.$$

$$\text{1st income} = \frac{£29000 \times 3\frac{1}{2}}{100} = £1015$$

$$\text{2d income} = \frac{£31680 \times 3}{100} = £950 \text{ 8s.}$$

$$\therefore \text{Loss} = £1015 - £950 \text{ 8s.} = £64 \text{ 12s}$$

(12) \$115 : \$2000 :: \$8 : gain.

$$\therefore \text{Gain} = \$\frac{2000 \times 8}{115} = \$139\frac{2}{3}.$$

(13) £100 : £95 :: £5000000 : value of in. £5000000 in 3 per cts.

$$\therefore \text{Value} = \frac{£5000000 \times 95}{100} = £4750000.$$

$$\text{Amount still due} = £5016000 - £4750000 = £266000.$$

£3 : £3 $\frac{1}{2}$:: £95 : value of the 3 $\frac{1}{2}$ per cts.

$$\therefore \text{Value} = \frac{£3\frac{1}{2} \times 95}{3} = £110\frac{5}{6}.$$

£110 $\frac{5}{6}$: £100 :: £266000 : amount of 3 $\frac{1}{2}$ per cent. stock.

$$\therefore \text{Amount of 3}\frac{1}{2} \text{ stock} = \frac{£266000 \times 100}{110\frac{5}{6}} = £240000$$

$$(14) \text{ £}93\frac{1}{2} : \text{£}18700 :: \text{£}3\frac{1}{2} : \text{income.}$$

$$\therefore \text{Income} = \text{£} \frac{18700 \times 3\frac{1}{2}}{93\frac{1}{2}} = \text{£}700.$$

$$\frac{1}{2} \text{ of } \text{£}18700 = \text{£}3740; \frac{4}{5} \text{ of } \text{£}18700 = \text{£}14960;$$

$$\therefore \text{£}96 : \text{£}3740 :: \text{£}4 : \text{income from 1st investment.}$$

$$\therefore \text{Income} = \text{£} \frac{3740 \times 4}{96} = \text{£}155 \text{ 16s. 8d.}$$

$$\text{£}90 : \text{£}14960 :: \text{£}3 : \text{income from 2d investment.}$$

$$\therefore \text{Income} = \text{£} \frac{14960 \times 3}{90} = \text{£}498 \text{ 13s. 4d.};$$

$$\therefore \text{total income} = \text{£}155 \text{ 16s. 8d.} + \text{£}498 \text{ 13s. 4d.} = \text{£}654 \text{ 10s.}$$

$$\text{Hence loss} = \text{£}700 - \text{£}654 \text{ 10s.} = \text{£}45 \text{ 10s.}$$

This question may be solved by obtaining the am't of stock in each case and then the incomes.

$$(15) \text{ £}91 : \text{£}5460 :: \text{£}100 : \text{am't of 3 per cent. st'k.}$$

$$\therefore \text{Amount} = \text{£} \frac{100 \times 5460}{91} = \text{£}6000.$$

$$\text{£}100 : \text{£}93\frac{1}{2} :: \text{£}2000 : \text{produce from 1st sale.}$$

$$\therefore \text{Produce} = \text{£} \frac{2000 \times 93\frac{1}{2}}{100} = \text{£}1870.$$

$$\text{£}100 : \text{£}85 :: \text{£}4000 : \text{produce from 2d sale.}$$

$$\therefore \text{Produce} = \text{£} \frac{4000 \times 85}{100} = \text{£}3400;$$

$$\therefore \text{total amount realized} = \text{£}3400 + \text{£}1870 = \text{£}5270.$$

$$\text{£}102 : \text{£}5270 :: \text{£}100 : \text{amount of } 4\frac{1}{2} \text{ per cent. st'k.}$$

$$\therefore \text{Amount} = \text{£} \frac{5270 \times 100}{102} = \text{£}5166 \text{ 13s. 4d.}$$

$$\text{Income from 3 per cent. stock} = \text{£} \frac{6000 \times 3}{100} = \text{£}180.$$

$$\text{Income from } 4\frac{1}{2} \text{ per ct. st'k} = \text{£} \frac{5166 \text{ 13s. 4d.} \times 4\frac{1}{2}}{100} =$$

$$\text{£}232 \text{ 10s.}$$

$$\therefore \text{Gain} = \text{£}232 \text{ 10s.} - \text{£}180 = \text{£}52 \text{ 10s.}$$

(16) £3 : £350 :: £100 : is to amount invested in 3 per cents.

$$\therefore \text{Amount invested} = £ \frac{100 \times 350}{3} = £11666\frac{2}{3}.$$

£100 : £11666 $\frac{2}{3}$:: £87 $\frac{1}{4}$: value of 3 per cent. stock.

$$\therefore \text{Value} = £ \frac{349 \times 35000}{100 \times 3 \times 4} = £10179\frac{1}{6}.$$

£104 $\frac{1}{2}$: £10179 $\frac{1}{6}$:: £5 : income from 5 per cents.

$$\therefore \text{income from 5 per cents} = £ \frac{5 \times 61075 \times 8}{839 \times 6} =$$

£485 5s. 11 $\frac{1}{4}$ d. $\frac{807}{839}$ q.

$$£485 \text{ 5s. } 11\frac{1}{4}\text{d. } \frac{807}{839}\text{q.} - £350 = £135 \text{ 5s. } 11\frac{1}{4}\text{d. } \frac{807}{839}\text{q.}$$

EX. LXXIV. (p. 141.)

(1) \$100 : \$4300 :: $\frac{1}{3}$: commission required.

$$\therefore \text{Commission} = \$ \frac{4300 \times \frac{1}{3}}{100} = \$5.37\frac{1}{2}.$$

(2) \$100 : \$9626.55 :: \$2.60 : premium required.

$$\therefore \text{Premium required} = \$ \frac{2.60 \times 9626.55}{100} = \$250.2903.$$

(3) \$1560 stock : \$100 stock :: \$4.60 : per cent.

$$\therefore \text{Per cent.} = \frac{4.60 \times 100}{1560} = \$ \frac{115.0}{3900} = 29\frac{1}{3}\text{ cts.}$$

per cent.

(4) \$2.40 : \$100 :: \$45.60 : sum required.

$$\therefore \text{Sum required} = \$ \frac{45.60 \times 100}{2.40} = \$1900.$$

(5) 25 yds. \times 36 = 900 yds. : 900 yds. at 10 $\frac{1}{2}$ d per yd. = £39 7s. 6d.

(1) £39 7s. 6d. - (£32 16s. 3d. + 6s. 3d.) = £6 5s. = whole gain.

(2) £33 2s. 6d. : £100 :: £6 5s. : required gain per cent.

$$\therefore \text{gain per cent.} = \frac{24000 \times 125}{7950}\text{s.} = £18 \text{ 17s. } 2\frac{1}{2}\text{d. } \frac{11}{13}\text{q.}$$

(6) Cost of 1280 bus. at \$1.20 per bus. = \$1536.00

(1) $(1280 \times 3\frac{1}{4})$ cts. = carriage etc. expenses = \$48.00.

Total expenses = \$1536.00 + \$48.00 = \$1584.00.

1280 bus. at \$1.40 per bushel = \$1792 = selling price.

\therefore Gain = \$1792 - \$1584 = \$208;

(2) \$1584 : \$100 \therefore \$208 : gain per cent.

\therefore Gain per cent. = $\$ \frac{100 \times 208}{1584} = \13.13

(3) Also to have gained \$400 he should have sold the wheat for \$1584 + \$400 = \$1984.

And \$1984 \div 1280 = \$1.55 = required price per bus.

(7) (1) If he buys for 6s. 8d. and sells for 7s. 4d. he gains 8d.

\therefore 6s. 8d. : 100d. \therefore 8d. : required gain per cent.

\therefore Gain per cent. = $\frac{8 \times 100}{80} = 10$ per cent.

Also if he buys for 7s. 4d. and sells for 6s. 8d. he loses 8d.

(2) \therefore 7s. 4d. : 100d. \therefore 8d. : required loss per cent.

\therefore Loss per cent. = $\frac{8 \times 100}{88} = 9\frac{1}{11}$ per cent. = £9 1s.

9 $\frac{1}{11}$ d. $\frac{1}{11}$ q.

(8) If it cost \$96 per cwt. the price per lb. will be 96 cents.

\therefore \$100 : \$125 \therefore 96 cents : price required.

\therefore Price required = $\frac{96 \times 125}{100}$ cents = \$1.20.

(9) \$6 per cwt. = 6 cents per lb.

\therefore Gain per lb. = $(10 - 6)$ d. = 4 cents.

6 cents : \$100 \therefore 4 cents : gain per cent.

\therefore Gain per cent. = $\frac{10000 \times 4}{6} = \$66.66\frac{2}{3} = 66\frac{2}{3}$ per ct.

(10) £100 : 112 $\frac{1}{2}$ \therefore 4s. 8d. : required price.

\therefore Required price = $\frac{56 \times 112\frac{1}{2}}{100}$ d. = 63d. = 5s. 3d.

(11) £112½ : 4s. 8d. :: £1000 : prime cost.

$$\therefore \text{Prime cost} = \frac{24000 \times 56}{27000} \text{d.} = 4\text{s. } 1\frac{1}{4}\text{d. } \frac{1}{2}\text{q.}$$

(12) 40 lbs. @ 84c. = \$33.60

44 lbs. @ 93c. = \$40.92

55 lbs. @ \$1.08 = \$59.40

Total cost = \$133.92

\therefore Gain = \$188.16 - \$133.92 = \$54.24.

\$133.92 : \$100 :: \$54.24 : required gain per cent.

$$\therefore \text{Gain} = \frac{100 \times 54.24}{133.92} = 40\frac{1}{2}\frac{4}{7}\text{ per cent.}$$

(13) 26 lbs. @ 5s. 3d. cost £6 16s. 6d.

32 lbs. @ 5s. 7d. cost £8 18s. 8d.

36 lbs. @ 6s. 1d. cost £10 19s.

\therefore 94 lbs. cost £26 14s. 2d.

£100 : £40 :: £26 14s. 2d. : gain.

$$\therefore \text{Gain} = \frac{6410 \times 40}{100} \text{d.} = £10 \text{ 13s. 8d.}$$

\therefore Selling price will be £26 14s. 2d. + £10 13s. 8d. = £37 7s. 10d.

\therefore Price per lb. will be £37 7s. 10d. ÷ 94 = 7s. 11½d. 4¼q.

(14) £90 : £100 :: 15s. : buying price.

$$\therefore \text{Buying price} = \frac{15 \times 100}{90} \text{s.} = 16\text{s. 8d.}$$

£100 : £110 :: 16s. 8d. : required selling price.

$$\therefore \text{Required price} = \frac{200 \times 110}{100} \text{d.} = 220\text{d.} = 18\text{s. 4d.}$$

(15) He gains on 11 eggs the price of 7 eggs.

\therefore 11 : 7 :: £100 : required gain.

$$\therefore \text{Gain} = \frac{100 \times 7}{11} = £63 \text{ 12s. } 8\frac{1}{2}\text{d. } 1\frac{1}{4}\text{q.}$$

(16) \$130 : \$100 :: \$1.56 : cost price.

$$\therefore \text{Cost price} = \$ \frac{1.56 \times 100}{130} = \$1.20.$$

Ex. LXXV. (p. 142.)

(1)	(2)	(3)
104	\$4.25	87.8
96	\$5.75	87.7
92	\$6.60	87.6
90	\$7.80	86.8
82	\$3.50	85.0
81	\$5.58	84.5
<hr/>		
6) 545	6) \$33.48	83.8
<hr/>		
90.83	\$5.58	78.0
		77.9
		77.6
		<hr/>
		10) 836.7
		<hr/>
		83.67

(4)

United ages of 17 children = 102 years.

United ages of 26 children = 195 years.

United ages of 35 children = 323.75 years.

United ages of 20 children = 200 years.

United ages of 8 children = 98 years.

 \therefore United ages of 106 = 918.75 years. \therefore Average age = $918.75 \text{ years} \div 106 = 8.667 \dots \text{ years.}$

(5)

United ages of 27 men = 1539 years.

United ages of 11 men = 583 years.

United ages of 8 men = 474 years.

 \therefore United ages of 19 men = 1057 years. \therefore The united ages of the remaining 8 men = $(1539 - 1057) \text{ years} = 482 \text{ years.}$ \therefore The average age = $482 \div 8 = 60\frac{1}{2} \text{ years.}$

(6) $100 : 112 :: 31326 : \text{population of 1st in 1861.}$

$$\therefore \text{Population} = \frac{31326 \times 112}{100} = 35085.12.$$

$100 : 110 :: 42324 : \text{population of 2d in 1861.}$

$$\therefore \text{Population} = \frac{42324 \times 110}{100} = 46556.4.$$

$100 : 82 :: 6706 : \text{population of 3d in 1861.}$

$$\therefore \text{Population} = \frac{6706 \times 82}{100} = 5498.92.$$

$\therefore \text{United population in 1861} = 35085.12 + 46556.4 + 5498.92 = 87140.44.$

$$\therefore \text{Average population} = 87140.44 \div 3 = 29046.81\bar{3}.$$

(7) Whole gain from 1853 to 1863 = £184 11s. 6d. \times 11 = £2030 6s. 6d.

£2030 6s. 6d. + £151 9s. 10d. = whole gain = £2181 16s. 4d.

£2181 16s. 4d. - £76 8s. 4d. = £2105 8s. = whole gain during 11 years. \therefore Average gain = £2105 8s. \div 11 = £191 8s.

Ex. LXXVI. (p. 145.)

(1) ⁽¹⁾ $2 + 3 + 4 = 9.$

$9 : 12 :: 1008 : \text{1st part.}$

$$\therefore \text{1st part} = \frac{1008 \times 2}{9} = 224.$$

$9 : 3 :: 1008 : \text{2d part.}$

$$\therefore \text{2d part} = \frac{1008 \times 3}{9} = 336.$$

$9 : 4 :: 1008 : \text{3d part.}$

$$\therefore \text{3d part} = \frac{1008 \times 4}{9} = 448.$$

(2) ⁽²⁾ $5 + 11 + 16 = 32.$

$32 : 5 :: \$260 : \text{1st part.}$

$$\therefore \text{1st part} = \$ \frac{260 \times 5}{32} = \$40.62\frac{1}{2}.$$

(Continued on next page.)

(1 Continued.)

$$32 : 11 :: \$260 : 2d \text{ part.}$$

$$\therefore 2d \text{ part} = \$\frac{260 \times 11}{32} = \$89.37\frac{1}{2}.$$

$$32 : 16 :: \$260 : 3d \text{ part.}$$

$$\therefore 3d \text{ part} = \$\frac{260 \times 16}{32} = \$130.$$

$$(^3) 11 : 5 :: 145 \text{ ac., } 3 \text{ ro., } 33 \text{ po.} : \text{share of 1st.}$$

$$\therefore \text{Share of 1st.} = \frac{145 \text{ ac., } 3 \text{ ro., } 33 \text{ po.} \times 5}{11} = 66 \text{ ac.,}$$

1 ro., 15 po.

$$11 : 6 :: 145 \text{ ac., } 3 \text{ ro., } 33 \text{ po.} : \text{share of 2d.}$$

$$\therefore \text{Share of 2d} = \frac{145 \text{ ac., } 3 \text{ ro., } 33 \text{ po.} \times 6}{11} = 79 \text{ ac., } 2 \text{ ro.,}$$

18 po.

$$(^4) \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} = \frac{77}{60}.$$

$$\frac{77}{60} : \frac{1}{2} :: £110 : \text{share of 1st.}$$

$$\therefore \text{Share of 1st.} = £\frac{110 \times 60}{77 \times 2} = £42 \text{ 17s. } 1\frac{1}{2}\text{d. } \frac{2}{3}\text{q.}$$

$$\frac{77}{60} : \frac{1}{3} :: £110 : \text{share of 2d.}$$

$$\therefore \text{Share of 2d} = \frac{110 \times 60}{77 \times 3} = £28 \text{ 11s. } 5\frac{1}{2}\text{d.}$$

$$\frac{77}{60} : \frac{1}{4} :: £110 : \text{share of 3d.}$$

$$\therefore \text{Share of 3d} = £\frac{110 \times 60}{77 \times 4} = £21 \text{ 8s. } 6\frac{1}{2}\text{d. } \frac{2}{3}\text{q.}$$

$$\frac{77}{60} : \frac{1}{5} :: £110 : \text{share of 4th.}$$

$$\therefore \text{Share of 4th} = £\frac{110 \times 60}{77 \times 5} = £17 \text{ 2s. } 10\frac{1}{2}\text{d. } \frac{1}{3}\text{q.}$$

$$(2) (^1) \$320 + \$560 + \$720 = \$1600.$$

$$\$1600 : \$320 :: \$680 : A's \text{ share of the gain.}$$

$$\therefore A's \text{ share} = \$\frac{680 \times 320}{1600} = \$136.$$

$$\$1600 : \$560 :: \$680 : B's \text{ share of the gain.}$$

$$\therefore B's \text{ share} = \$\frac{680 \times 560}{1600} = \$238.$$

(Continued on next page.)

(2 continued.)

\$1600 : \$720 :: \$680 : *C*'s share of the gain.

$$\therefore C's \text{ share} = \$ \frac{680 \times 720}{1600} = \$306.$$

(2) £175 + £210 + £265 = £650.

£650 : £210 :: £422 10s. : *C*'s share.

$$\therefore C's \text{ share} = £ \frac{422\frac{1}{2} \times 210}{650} = £136 \text{ 10s.}$$

(3) 48·856 + 43·265 = 92·121.

100 - 92·121 = 7·879 = per centage of hydrogen.

100 : 48·856 :: 2240 : No. of lbs. of oxygen.

$$\therefore \text{Lbs. of oxygen} = \frac{2240 \times 48·856}{100} = 1094·3744.$$

100 : 43·265 :: 2240 : No. of lbs. of carbon.

$$\therefore \text{Lbs. of carbon} = \frac{2240 \times 43·265}{100} = 969·136.$$

100 : 7·879 :: 2240 : No. of lbs. of hydrogen.

$$\therefore \text{No. of lbs. of hydrogen} = \frac{2240 \times 7·879}{100} = 176·4896$$

(4) 3 : 2 :: 100 : per centage of gold.

$$\therefore \text{Per centage of gold} = \frac{100 \times 2}{3} = 66\frac{2}{3}.$$

3 : 1 :: 100 : per centage of silver.

$$\therefore \text{Per centage of silver} = \frac{100 \times 1}{3} = 33\frac{1}{3}.$$

$$(5) \text{ Equated time} = \frac{150 \times 2 + 210 \times 6 + 120 \times 7}{150 + 210 + 120} = 5 \text{ mos.}$$

$$(6) \text{ Equated time} = \frac{(1000 \times 6) - (400 \times 3)}{1000 - 400} = 8 \text{ mos.}$$

(7) \$4000 × 2 = \$8000 = *A*'s contribution.

\$300 × 2 + 300 × 1½ = \$1050 = *B*'s contribution.

\$200 × 2 + 500 × 1 = \$900 = *C*'s contribution.

\$8000 + \$1050 + \$900 = \$9950.

\$9950 : \$3000 :: \$7950 : *A*'s share of the gain.

$$\therefore A's \text{ share} = \$ \frac{7950 \times 8000}{9950} = \$6400.$$

(Continued on next page.)

(7 continued.)

\$9950 : \$1050 :: \$7960 : *B*'s share of the gain.

$$\therefore B\text{'s share} = \frac{1050 \times 7960}{9950} = \$840.$$

\$9950 : \$900 : \$7960 : *C*'s share of the gain.

$$\therefore C\text{'s share} = \$\frac{7960 \times 900}{9950} = \$720.$$

(8) 10 per cent. of £1600 = £160; £1600—£160 = £1440.

£6400 : £2400 :: £1440 : *A*'s share of the gain. .

$$\therefore A\text{'s share} = £\frac{2400 \times 1440}{6400} = £540, \text{ which added to } £160 = £700.$$

£6400 : £4000 :: £1440 : *B*'s share of the gain.

$$\therefore B\text{'s share} = £\frac{1440 \times 4000}{6400} = £900.$$

(9) Since the keep of a horse : the keep of a sheep
:: 3 : 1, therefore 20 horses are equivalent to 60 sheep.

In the same manner 15 oxen are equivalent to 30 sheep.

 $\therefore A$ puts in 60 sheep, B puts in 30 sheep, C puts in 10 sheep.

$$60 + 30 + 10 = 100.$$

100 : 60 :: \$60 : *A*'s share of the rent.

$$\therefore A\text{'s share} = \$\frac{60 \times 60}{100} = \$36.$$

100 : 30 :: \$60 : *B*'s share of the rent.

$$\therefore B\text{'s share} = \$\frac{60 \times 30}{100} = \$18.$$

100 : 10 :: \$60 : *C*'s share of the rent.

$$\therefore C\text{'s share} = \$\frac{60 \times 10}{100} = \$6.$$

(10) $9 : 10 :: 1\frac{1}{2}$ pts. : widow's share.

\therefore Widow's share $= \frac{1\frac{1}{2} \times 10}{9}$ pts. $= 1\frac{2}{3}$ pts.

$5 : 6 :: 1\frac{2}{3}$ pts. : old man's share.

\therefore Old man's share $= \frac{1\frac{2}{3} \times 6}{5}$ pts. $= 2$ pts.

If one widow receive $1\frac{2}{3}$ pts. 9 will receive $(9 \times 1\frac{2}{3}) = 15$ pts.: similarly 6 single women will receive $(6 \times 1\frac{1}{2})$ pts. $= 9$ pts. \therefore The total amount given to the women $= (15 + 9)$ pts. $= 24$ pts. But the men had twice as much as the women, \therefore the men received (24×2) pts. $= 48$ pts.; and as each man received 2 pts. the total number of men must have been $48 \div 2 = 24$.

Ex. LXXVII. (p. 149.)

$$\begin{array}{r} (1) \quad \dot{1}9\dot{6} \quad (14 \\ 1 \\ 24 \overline{) 96} \\ \underline{96} \end{array}$$

$$\begin{array}{r} \dot{2}8\dot{9} \quad (17 \\ 1 \\ 27 \overline{) 189} \\ \underline{189} \end{array}$$

$$\begin{array}{r} \dot{6}2\dot{5} \quad (25 \\ 4 \\ 45 \overline{) 225} \\ \underline{225} \end{array}$$

$$\begin{array}{r} (2) \quad \dot{8}4\dot{1} \quad (29 \\ 4 \\ 49 \overline{) 441} \\ \underline{441} \end{array}$$

$$\begin{array}{r} \dot{9}0\dot{0} \quad (30 \\ 9 \\ 60 \overline{) 00} \\ \underline{00} \end{array}$$

$$\begin{array}{r} \dot{1}7\dot{6}4 \quad (42 \\ 16 \\ 82 \overline{) 164} \\ \underline{164} \end{array}$$

$$\begin{array}{r} (3) \quad 240\dot{1} \quad (49 \\ 16 \\ 89 \overline{) 801} \\ \underline{801} \end{array}$$

$$\begin{array}{r} 7\dot{5}6\dot{9} \quad (87 \\ 64 \\ 167 \overline{) 1169} \\ \underline{1169} \end{array}$$

$$\begin{array}{r} 9\dot{6}0\dot{1} \quad (98 \\ 81 \\ 188 \overline{) 1504} \\ \underline{1504} \end{array}$$

$$\begin{array}{r} (4) \quad \dot{1}24\dot{2}\dot{1} \quad (111 \\ 1 \\ 21 \overline{) 23} \\ \underline{21} \\ 221 \overline{) 221} \\ \underline{221} \end{array}$$

$$\begin{array}{r} \dot{4}000\dot{0} \quad (200 \\ 4 \\ 400 \overline{) 0000} \\ \underline{0000} \end{array}$$

$$\begin{array}{r} 388\dot{1}2\dot{9} \quad (623 \\ 36 \\ 122 \overline{) 281} \\ \underline{244} \\ 1243 \overline{) 3729} \\ \underline{3729} \end{array}$$

$$(5) \quad \begin{array}{r} 494209 \text{ (703)} \\ 49 \end{array}$$

$$1403 \overline{) 4209} \\ \underline{4209}$$

$$\begin{array}{r} 582169 \text{ (763)} \\ 49 \end{array}$$

$$146 \overline{) 921} \\ \underline{876} \\ 1523 \overline{) 4569} \\ \underline{4569}$$

$$\begin{array}{r} 259081 \text{ (509)} \\ 25 \end{array}$$

$$1009 \overline{) 9081} \\ \underline{9081}$$

$$(6) \quad \begin{array}{r} 1234321 \text{ (1111)} \\ 1 \end{array}$$

$$21 \overline{) 23} \\ \underline{21}$$

$$221 \overline{) 243} \\ \underline{221}$$

$$2221 \overline{) 2221} \\ \underline{2221}$$

$$\begin{array}{r} 28547649 \text{ (5343)} \\ 25 \end{array}$$

$$103 \overline{) 354} \\ \underline{309}$$

$$1064 \overline{) 4576} \\ \underline{4256}$$

$$10683 \overline{) 32049} \\ \underline{32049}$$

$$(7) \quad \begin{array}{r} 62504836 \text{ (7906)} \\ 49 \end{array}$$

$$149 \overline{) 1350} \\ \underline{1341}$$

$$15806 \overline{) 94836} \\ \underline{94836}$$

$$\begin{array}{r} 33016516 \text{ (5746)} \\ 25 \end{array}$$

$$107 \overline{) 801} \\ \underline{749}$$

$$1144 \overline{) 5265} \\ \underline{4576}$$

$$11486 \overline{) 68916} \\ \underline{68916}$$

$$\begin{array}{r} 49112064 \text{ (7008)} \\ 49 \end{array}$$

$$14008 \overline{) 112064} \\ \underline{112064}$$

$$(8) \quad \begin{array}{r} 182493081 \text{ (13509)} \\ 1 \end{array}$$

$$23 \overline{) 82} \\ \underline{69}$$

$$265 \overline{) 1349} \\ \underline{1325}$$

$$27009 \overline{) 243081} \\ \underline{243081}$$

$$\begin{array}{r} 47.61 \text{ (6.9)} \\ 36 \end{array}$$

$$12.9 \overline{) 11.61} \\ \underline{11.61}$$

(9) $\cdot 008836$ ($\cdot 094$)

$$\begin{array}{r}
 00 \\
 09 \overline{) 88} \\
 \underline{81} \\
 184 \overline{) 736} \\
 \underline{736}
 \end{array}$$

 $445 \cdot 336609$ ($21 \cdot 103$)

$$\begin{array}{r}
 4 \\
 41 \overline{) 45} \\
 \underline{41} \\
 421 \overline{) 433} \\
 \underline{421} \\
 42203 \overline{) 126609} \\
 \underline{126609}
 \end{array}$$

(10) $\cdot 000633679929$ ($\cdot 025173$)

$$\begin{array}{r}
 4 \\
 45 \overline{) 233} \\
 \underline{225} \\
 501 \overline{) 867} \\
 \underline{501} \\
 5027 \overline{) 36699} \\
 \underline{35189} \\
 50343 \overline{) 151029} \\
 \underline{151029}
 \end{array}$$

 $\cdot 0000000009$ ($\cdot 000003$)9(11) $51 \cdot 00000000$ ($7 \cdot 1414$)

$$\begin{array}{r}
 49 \\
 141 \overline{) 200} \\
 \underline{141} \\
 1424 \overline{) 5900} \\
 \underline{5696} \\
 14281 \overline{) 20400} \\
 \underline{14281} \\
 142424 \overline{) 611900} \\
 \underline{569696}
 \end{array}$$

 51000000 ($7 \cdot 141$)

$$\begin{array}{r}
 49 \\
 141 \overline{) 200} \\
 \underline{141} \\
 1424 \overline{) 5900} \\
 \underline{5696} \\
 14281 \overline{) 20400} \\
 \underline{14281}
 \end{array}$$

(12) $5 \cdot 10000000 (2 \cdot 2583$

$$\begin{array}{r}
 4 \\
 42 \overline{) 110} \\
 \underline{84} \\
 445 \overline{) 2600} \\
 \underline{2225} \\
 4508 \overline{) 37500} \\
 \underline{36064} \\
 45163 \overline{) 148600} \\
 \underline{135489}
 \end{array}$$

$\cdot 05100000 (2258$

$$\begin{array}{r}
 4 \\
 42 \overline{) 110} \\
 \underline{84} \\
 445 \overline{) 2600} \\
 \underline{2225} \\
 4508 \overline{) 37500} \\
 \underline{36064} \\
 1436
 \end{array}$$

(13) $806 \cdot 52000000 (28 \cdot 03992 \quad 96304 \cdot 99300000 (310 \cdot 3304$

$$\begin{array}{r}
 4 \\
 48 \overline{) 406} \\
 \underline{384} \\
 563 \overline{) 2252} \\
 \underline{1689} \\
 5669 \overline{) 56300} \\
 \underline{51021} \\
 56789 \overline{) 527900} \\
 \underline{511101} \\
 567982 \overline{) 1679900} \\
 \underline{1135964}
 \end{array}$$

$$\begin{array}{r}
 9 \\
 61 \overline{) 63} \\
 \underline{61} \\
 6203 \overline{) 20499} \\
 \underline{18609} \\
 62063 \overline{) 189030} \\
 \underline{186189} \\
 6206604 \overline{) 28410000} \\
 \underline{24826416}
 \end{array}$$

(14) $\cdot 333333 (577$

$$\begin{array}{r}
 25 \\
 107 \overline{) 833} \\
 \underline{749} \\
 1147 \overline{) 8433} \\
 \underline{8029}
 \end{array}$$

(15) $\cdot 027777 (166$

$$\begin{array}{r}
 1 \\
 26 \overline{) 177} \\
 \underline{156} \\
 326 \overline{) 2177} \\
 \underline{1956}
 \end{array}$$

(16) $4\frac{26}{9} = 4 \cdot 734693 \dots$

$4 \cdot 734693 (2 \cdot 175$

$$\begin{array}{r}
 4 \\
 41 \overline{) 73} \\
 \underline{41} \\
 427 \overline{) 3246} \\
 \underline{2989} \\
 4345 \overline{) 25793} \\
 \underline{21725}
 \end{array}$$

(17) $2304 (48$

$$\begin{array}{r}
 16 \\
 88 \overline{) 704} \\
 \underline{704}
 \end{array}$$

$3481 (59$

$$\begin{array}{r}
 25 \\
 109 \overline{) 981} \\
 \underline{981}
 \end{array}$$

$\therefore 1 \frac{304}{481} = 1 \frac{16}{2405}$

$$(18) \quad \begin{array}{r} 4\dot{4}\dot{1} \text{ (21)} \\ 4 \\ \hline 41 \overline{) 41} \\ \underline{41} \end{array} \quad \begin{array}{r} \dot{6}\dot{4} \text{ (8)} \quad 2\dot{1} \div \dot{8} = 2\dot{6}25 \\ 64 \\ \hline \end{array}$$

(19) 5832 sovereigns = 13996780 pence and 2s. 6d. = 30d.; \therefore the sovereigns were worth $(1399680 \div 30)$ times the box = 46656.

The square root of 46656 is 216; \therefore the sovereigns were worth 216 times the shillings and the shillings were worth 216 times the box. But the value of the box is 2s. 6d.; \therefore the value of the shillings will be 216 times 2s. 6d. or 540 shillings.

EX. LXXVIII. (p. 152.)

$$(1) \quad \begin{array}{r} 1\dot{7}2\dot{8} \text{ (12)} \quad \dot{8}00\dot{0} \text{ (20)} \quad \dot{5}83\dot{2} \text{ (18)} \\ 1 \quad 8 \quad 1 \\ \hline 3 \times 1^2 = 3 \quad \overline{) 728} \quad \overline{) 000} \quad 3 \times 1^2 = 3 \quad \overline{) 4832} \\ 3 \times 10^2 = 300 \quad \overline{) 000} \quad 3 \times 10^2 = 300 \quad \overline{) 4832} \\ 3 \times 10 \times 2 = 60 \quad \overline{) 000} \quad 3 \times 10 \times 8 = 240 \quad \overline{) 4832} \\ 2^2 = 4 \quad \overline{) 000} \quad 8^2 = 64 \quad \overline{) 4832} \\ \underline{364} \quad \underline{000} \quad \underline{604} \\ 2 \quad \quad 8 \\ \underline{728} \quad \underline{728} \quad \underline{4832} \quad \underline{4832} \end{array}$$

$$(2) \quad \begin{array}{r} 7\dot{4}08\dot{8} \text{ (42)} \quad 42\dot{1}87\dot{5} \text{ (75)} \\ 64 \quad 343 \\ \hline 3 \times 4^2 = 48 \quad \overline{) 10088} \quad 3 \times 7^2 = 147 \quad \overline{) 78875} \\ 3 \times 40^2 = 4800 \quad \overline{) 10088} \quad 3 \times 70^2 = 14700 \quad \overline{) 78875} \\ 3 \times 40 \times 2 = 240 \quad \overline{) 10088} \quad 3 \times 70 \times 5 = 1050 \quad \overline{) 78875} \\ 2^2 = 4 \quad \overline{) 10088} \quad 5^2 = 25 \quad \overline{) 78875} \\ \underline{5044} \quad \underline{10088} \quad \underline{15775} \\ 2 \quad \quad 5 \\ \underline{10088} \quad \underline{10088} \quad \underline{78875} \quad \underline{78885} \end{array}$$

(Continued on next page.)

(2 continued.)

778688 (92
729

(3)

912673 (97
729

$$\begin{array}{r}
 3 \times 9^2 = 243 \\
 3 \times 90^2 = 24300 \\
 3 \times 90 \times 2 = 540 \\
 \underline{2^2 = 4} \\
 24844 \\
 \underline{2} \\
 49688 \quad 49688
 \end{array}$$

$$\begin{array}{r}
 3 \times 9^2 = 243 \\
 3 \times 90^2 = 24300 \\
 3 \times 90 \times 7 = 1890 \\
 \underline{7^2 = 49} \\
 26239 \\
 \underline{7} \\
 183673 \quad 183673
 \end{array}$$

1092727 (103 (4)
1134217728 (512
125

$$\begin{array}{r}
 3 \times 1^2 = 3 \\
 3 \times 10^2 = 300 \\
 3 \times 100^2 = 30000 \\
 3 \times 100 \times 3 = 900 \\
 \underline{3^2 = 9} \\
 30909 \\
 \underline{3} \\
 92727 \quad 92727
 \end{array}$$

$$\begin{array}{r}
 3 \times 5^2 = 75 \\
 3 \times 50^2 = 7500 \\
 3 \times 50 \times 1 = 150 \\
 \underline{1^2 = 1} \\
 7651 \\
 \underline{3 \times 51^2 = 7803} \\
 3 \times 510^2 = 780300 \\
 3 \times 510 \times 2 = 3060 \\
 \underline{2^2 = 4} \\
 783364 \\
 \underline{2} \\
 1566728 \quad 1566728
 \end{array}$$

64481201 (401
64

$$\begin{array}{r}
 3 \times 4^2 = 48 \\
 3 \times 40^2 = 4800 \\
 3 \times 400^2 = 480000 \\
 3 \times 400 \times 1 = 1200 \\
 \underline{1^2 = 1} \\
 481201 \quad 481201
 \end{array}$$

(5)

$$\begin{array}{r}
 444194 \cdot 947 \text{ (76} \cdot 3 \\
 343 \\
 \hline
 3 \times 7^2 = 147 \quad 101194 \\
 3 \times 70^2 = 14700 \\
 3 \times 70 \times 6 = 1260 \\
 6^2 = 36 \\
 \hline
 15996 \quad 95976 \\
 3 \times 76^2 = 17328 \quad 5218947 \\
 3 \times 760^2 = 1732800 \\
 3 \times 760 \times 3 = 6840 \\
 3^2 = 9 \\
 \hline
 1739649 \\
 3 \\
 \hline
 5218947 \quad 5218947
 \end{array}$$

$$\begin{array}{r}
 000202262003 \text{ (} \cdot 0587 \\
 125
 \end{array}$$

$$\begin{array}{r}
 3 \times 5^2 = 75 \quad 77262 \\
 3 \times 50^2 = 7500 \\
 3 \times 50 \times 8 = 1200 \\
 8^2 = 64 \\
 \hline
 8764 \quad 70112 \\
 3 \times 58^2 = 10092 \quad 7150003 \\
 3 \times 580^2 = 1009200 \\
 3 \times 580 \times 7 = 12180 \\
 7^2 = 49 \\
 \hline
 1021429 \quad 7150003
 \end{array}$$

(6)

 $131\cdot019108039 \text{ (5.079)}$
 125

$3 \times 5^2 = 75$	6019108
$3 \times 50^2 = 7500$	
$3 \times 500^2 = 750000$	
$3 \times 500 \times 7 = 10500$	
$7^2 = 49$	
<u>760549</u>	5323843
$3 \times 507^2 = 771147$	
$3 \times 5070^2 = 77114700$	695265039
$3 \times 5070 \times 9 = 136890$	
$9^2 = 81$	
<u>77251671</u>	695265039

 $7 \ 408518488000 \text{ (7420)}$
 343

$3 \times 7^2 = 147$	65518
$3 \times 70^2 = 14700$	
$3 \times 70 \times 4 = 840$	
$4^2 = 16$	
<u>15556</u>	62224
$3 \times 74^2 = 16428$	
$3 \times 740^2 = 1642800$	3294488
$3 \times 740 \times 2 = 4440$	
$2^2 = 4$	
<u>1647244</u>	3294488
	000

$$(7) \quad \sqrt[3]{27} = 3 \quad \sqrt[3]{64} = 4 \quad \therefore \sqrt[3]{\frac{27}{64}} = \frac{3}{4}$$

(8) $\frac{4}{15} = 2\dot{6}$

$$\begin{array}{r}
 26\dot{6}66\dot{6}66\dot{6} \quad (643 \\
 216 \\
 \hline
 3 \times 6^2 = 108 \quad 50666 \\
 3 \times 60^2 = 10800 \\
 3 \times 60 \times 4 = 720 \\
 4^2 = 16 \\
 \hline
 11536 \quad 46144 \\
 3 \times 64^2 = 12288 \quad 452666\dot{6} \\
 3 \times 640^2 = 1228800 \\
 3 \times 640 \times 3 = 5760 \\
 3^2 = 9 \\
 \hline
 1234569 \quad 3703707
 \end{array}$$

(9) $3\frac{1}{2} = 3\cdot 8$

$$\begin{array}{r}
 3\cdot 800000000 \quad (1560 \\
 1 \\
 \hline
 3 \times 1^2 = 3 \quad 2800 \\
 3 \times 10^2 = 300 \\
 3 \times 10 \times 5 = 150 \\
 5^2 = 25 \\
 \hline
 475 \quad 2375 \\
 3 \times 15^2 = 675 \quad 425000 \\
 3 \times 150^2 = 67500 \\
 3 \times 150 \times 6 = 2700 \\
 6^2 = 36 \\
 \hline
 70236 \quad 421416 \\
 3 \times 156^2 = 73008 \quad 3584000 \\
 3 \times 1560^2 = 7300800 \\
 3 \times 1560 \times 0 = 0 \\
 0^2 = 0 \\
 \hline
 7300800
 \end{array}$$

(10) $\sqrt[3]{1} = 1$

(11)

$$\begin{array}{r}
 \cdot 100000000 \text{ (} \cdot 464 \text{)} \\
 \underline{64} \\
 3 \times 4^2 = 48 \quad 36000 \\
 3 \times 40^2 = 4800 \\
 3 \times 40 \times 6 = 720 \\
 \underline{6^2 = 36} \\
 5556 \quad 33336 \\
 3 \times 46^2 = 6348 \quad 2664000 \\
 3 \times 460^2 = 634800 \\
 3 \times 460 \times 4 = 5520 \\
 \underline{4^2 = 16} \\
 640336 \quad 2561344
 \end{array}$$

(12)

$$\begin{array}{r}
 \cdot 010000000 \text{ (} \cdot 215 \text{)} \\
 \underline{8} \\
 3 \times 2^2 = 12 \quad 2000 \\
 3 \times 20^2 = 1200 \\
 3 \times 20 \times 1 = 60 \\
 \underline{1^2 = 1} \\
 1261 \quad 1261 \\
 3 \times 21^2 = 1323 \quad 739000 \\
 3 \times 210^2 = 132300 \\
 3 \times 210 \times 5 = 3150 \\
 \underline{5^2 = 25} \\
 135475 \quad 677375
 \end{array}$$

(13)

 $10\cdot000000000 (2\cdot154$

8

$$3 \times 2^2 = 12 \quad \overline{2000}$$

$$3 \times 20^2 = 1200$$

$$3 \times 20 \times 1 = 60$$

$$1^2 = 1$$

$$\overline{1261} \quad 1261$$

$$3 \times 21^2 = 1323 \quad \overline{739000}$$

$$3 \times 210^2 = 132300$$

$$3 \times 210 \times 5 = 3150$$

$$5^2 = 25$$

$$\overline{135475} \quad 677375$$

$$3 \times 215^2 = 138675 \quad \overline{61625000}$$

$$3 \times 2150^2 = 13867500$$

$$3 \times 2150 \times 4 = 25800$$

$$4^2 = 16$$

$$\overline{13893316} \quad \underline{55573264}$$

(14)

 $037373737 (333$

27

$$3 \times 3^2 = 27 \quad \overline{10373}$$

$$3 \times 30^2 = 2700$$

$$3 \times 30 \times 3 = 270$$

$$3^2 = 9$$

$$\overline{2979} \quad 8937$$

$$3 \times 33^2 = 3267 \quad \overline{1436737}$$

$$3 \times 330^2 = 326700$$

$$3 \times 330 \times 3 = 2970$$

$$3^2 = 9$$

$$\overline{329679} \quad \underline{989037}$$

Ex. LXXIX. (p. 152.)

PAPER I.

(1)	oz.	(2)	
16	4) 553553	(2)	144 : 175 :: 12 oz. : popor-
	4) 138388—1 4 × 0 +		tion of a lb. Avoirdupoise.
	[1 = 1 oz.]	$\frac{175 \times 12}{144} = 14\frac{7}{12}$.	
28	4) 34597—0		∴ 1 oz. Avoir. : 1 oz. Troy—
	7) 8649—1 4 × 4 +		∴ $14\frac{7}{12}$: 16 or as 175 : 192.
	[1 = 17 lbs.]		∴ 1 oz. Avoir. is $\frac{175}{192}$ of 1 oz.
	4) 1235—4		Troy.
	20) 308—3 qrs.		
	15 tons, 8 cwt.		
	15 Tons, 8 cwt., 3 qrs.,		
	17 lbs., 1 oz.		

(3)	£	fl.	c.	m.	
	2.	0.	7.	0.	= value of 1 cwt.
				16	
2 qrs. = $\frac{1}{2}$ of 1 cwt.	32	11	2	0	= value of 16 cwt.
1 qr. = $\frac{1}{2}$ of 2 qrs.	1	0	3	5	= value of 2 qrs.
14 lbs. = $\frac{1}{2}$ of 1 qr.		5	1	7.5	= value of 1 qr.
2 lbs. = $\frac{1}{7}$ of 14 lbs.		2	5	8.75	= value of 14 lbs.
			3	6.96428571	= val. of 2 lbs.
	£34.	9.	6.	8.21428571	= value of
					[16 cwt., 3 qrs., 14 lbs.]

$$(4) \quad (1) \quad 20803) 67273 \quad (3 \\ 62409$$

$$\hline 4864) 20803 \quad (4 \\ 19456$$

$$\hline 1347) 4864 \quad (3 \\ 4041$$

$$\hline 823) 1347 \quad (1 \\ 823$$

$$(2) \quad 2) 8, 9, 10, 12, 15, 18, 35, 84 \quad \hline 524) 823 \quad (1 \\ 524$$

$$2) 4, \quad 5, \quad 15, \quad 9, 35, 42 \quad \hline 299) 524 \quad (1 \\ 299$$

$$3) 2, \quad \quad 15, \quad 9, 35, 21 \quad \hline 2) \quad \quad 5, \quad 3, 35, \quad 7 \\ \therefore \text{L. C. M.} = 2 \times 2 \times 3 \times 2 \times 3 \times 35 = 2520. \quad 225) 299 \quad (1 \\ 74) 225 \quad (3 \\ 222 \quad \hline 74$$

$$3) 74 \quad (24 \\ 72$$

$$\hline 2) 3 \quad (1 \\ 2$$

$$\hline 1$$

$\therefore 1$ is the G. C. M.

$$(5) \quad (1) \quad \frac{3}{8} \text{ of } \frac{5}{11} \text{ of } 99\frac{1}{2} = \frac{3}{8} \text{ of } \frac{5}{11} \text{ of } 144\frac{1}{2} = 17 \\ \frac{5}{7} \text{ of } \frac{2}{3} \text{ of } 69\frac{3}{4} = \frac{5}{7} \text{ of } \frac{2}{3} \text{ of } 110\frac{3}{4} = 11 \\ \frac{4}{7} \text{ of } \frac{2}{3} \text{ of } 306\frac{1}{4} = \frac{4}{7} \text{ of } \frac{2}{3} \text{ of } 122\frac{1}{4} = 35 \\ 17 + 11 + 35 = 63.$$

$$(2) \quad 13s. 1\frac{1}{2}d. = 315 \text{ half pence}$$

$$\frac{3}{4} \text{ of } 1\frac{1}{2} \text{ of a guinea} = \frac{3}{4} \text{ of } \frac{3}{2} \text{ of } 504 \text{ h'f p.} = 567 \text{ h'f p.}$$

$$\therefore \text{Fraction required is } \frac{3}{5} \frac{1}{6} \frac{5}{7} = \frac{5}{6}.$$

(Continued on next page.)

(5 continued.)

$$(3) \frac{107}{448} \text{ of a ton} = \frac{107 \times 20}{448} \text{ cwt.} = 4\frac{87}{112} \text{ cwt.}$$

$$\frac{87}{112} \text{ of a cwt.} = \frac{87 \times 4}{112} \text{ qrs.} = 3\frac{3}{8} \text{ qrs.}$$

$$\frac{3}{8} \text{ of a qr.} = \frac{3 \times 28}{28} \text{ lbs.} = 3 \text{ lbs.}$$

4 cwt., 3 qrs., 3 lbs.

$$(6) \begin{array}{r} 37 \overline{) 7792 \cdot 20} \quad (21060 \end{array}$$

$$\begin{array}{r} 74 \\ \hline 39 \\ 37 \\ \hline 222 \\ 222 \\ \hline 0 \end{array}$$

$$7792 \cdot 2 = 7792\frac{1}{5}$$

$$\cdot 37 = \frac{37}{100}$$

$$7792\frac{1}{5} \div \frac{37}{100} = 21060 \times \frac{100}{37} = 21060.$$

$$370) \cdot 0077922 \quad (00002106$$

$$\begin{array}{r} 74 \\ \hline 39 \\ 37 \\ \hline 222 \\ 222 \\ \hline \end{array}$$

$$\cdot 007792 = \frac{7792}{100000000}$$

$$\frac{7792}{100000000} \times \frac{100}{37} = \frac{21060}{100000000} = 00002106.$$

PAPER II.

$$(1) \quad (1) \quad \$7300$$

$$3\frac{3}{4}$$

$$\$21900$$

$$5475$$

$$\$273.75$$

$$365 : 120 :: \$273.75 : \text{interest required.}$$

$$\therefore \text{Int. req'd} = \$ \frac{273.75 \times 120}{365}$$

$$= \$90$$

$$(2) \text{ Int. on } £100 \text{ for } 2\frac{1}{4} \text{ yrs.}$$

$$\text{at } 3\frac{1}{2} \text{ per cent.} = £9 \text{ 12s. 6d.}$$

$$£109 \text{ 12s. 6d.} : £3204 \text{ 14s. 1d.}$$

$$:: £9 \text{ 12s. 6d.} : \text{disc't req'd}$$

$$\therefore \text{Disc't} = \frac{769129 \times 2310}{26310} \text{ d.}$$

$$= 67529 \text{ d.} = £281 \text{ 7s. 5d.}$$

$$(2) \$3320 - \$2656 = \$664.$$

$$\$2656 : \$100 :: \$664 : \text{required gain per cent.}$$

$$\therefore \text{Required gain} = \$ \frac{664 \times 100}{2656} = \$25.$$

$$\$3320 : \$100 :: \$664 : \text{loss per cent.}$$

$$\therefore \text{Loss per cent.} = \$ \frac{664 \times 100}{3320} = \$20.$$

$$(3) (1) \quad \begin{array}{r} 930372004 \\ 30502 \end{array}$$

$$\begin{array}{r} 9 \\ 605 \overline{) 3037} \\ \underline{3025} \\ 61002 \overline{) 122004} \\ \underline{122004} \end{array}$$

$$(2) \quad \begin{array}{r} 16777216 \\ 8 \end{array} (256$$

$$\begin{array}{r} 8 \\ 3 \times 2^2 = 12 \quad \overline{8777} \\ 3 \times 20^2 = 1200 \\ 3 \times 20 \times 5 = 300 \\ 5^2 = 25 \\ \underline{1525} \quad 7625 \\ 3 \times 25^2 = 1875 \quad \overline{1152216} \\ 3 \times 250^2 = 187500 \\ 3 \times 250 \times 6 = 4500 \\ 6^2 = 36 \\ \underline{192036} \quad 1152216 \end{array}$$

(3) Surface of square = 2533 sq. ft., 64 sq. in. or 364816 sq. inches; \therefore side of square = $\sqrt{364816}$ sq. in. = 604 in. = 16 yds., 2 ft., 4 in.; \therefore perimeter of square = 16 yds., 2 ft., 4 in. \times 4 = 67 yds., 4 in.

$$(4) \begin{array}{r} 365 \\ 5 \\ \hline 1825 \end{array}$$

$$\begin{array}{r} 365 \\ 20 \\ \hline 7300 \end{array}$$

$$\begin{array}{r} 365 \\ 300 \\ \hline 109500 \end{array}$$

$$\begin{array}{r} 109500 \\ 7300 \\ 1825 \\ \hline 118625 \end{array}$$

(5) 2) 22932

2) 11466

3) 5733

3) 1911

7) 637

$2 \times 2 \times 3 \times 3 \times 7 \times 7 \times 13.$

7) 637

7) 91

13

(6) If he travels $22\frac{1}{7}$ miles per hour, he will travel 20 miles in $\frac{20}{22\frac{1}{7}}$ of an hour, or $\frac{2}{3}\frac{1}{7}$ hours.

He then travels the remaining 32 miles at the rate of ($\frac{1}{6}$ of $22\frac{1}{7}$) miles per hour = $3\frac{2}{3}\frac{1}{7}$ miles per hour.

\therefore To travel 32 miles he would require $(32 \div 3\frac{2}{3}\frac{1}{7})$ hrs. = $8\frac{1}{3}\frac{1}{7}$ hrs. which added to the above $\frac{2}{3}\frac{1}{7}$ hr. = $9\frac{1}{3}\frac{1}{7}$ hrs. or 9 hrs., $34' 27\frac{3}{4}''$.

If he start at 9 A. M. and travel for 9 hrs. $34' 27\frac{3}{4}''$ he will arrive at his journey's end at 6 h. $34' 27\frac{3}{4}''$ P. M.

PAPER III.

(1) If A fire twice in 3 minutes, he requires $1\frac{1}{2}$ minutes to fire once; \therefore to fire 55 cartridges he requires $(55 \times 1\frac{1}{2})$ minutes = $82\frac{1}{2}$ minutes.

Similarly B will require $(55 \times 1\frac{2}{3})$ minutes = $91\frac{2}{3}$ minutes; $\therefore B$ will be firing $(91\frac{2}{3} - 82\frac{1}{2})$ minutes after A has ceased = $9\frac{1}{6}$ minutes: and as he requires $1\frac{2}{3}$ minutes to fire once, he will fire $(9\frac{1}{6} \div 1\frac{2}{3})$ times = $5\frac{1}{2}$ times.

(2) (1) $\frac{17}{20 \times 8} = \frac{17}{160}$

160) 17.0 (10625
160

1000

960

400

320

800

800

(2) 3s. 0 $\frac{1}{2}$ d. = 73 half pence

£5 = 2400 half pence

\therefore Fraction = $\frac{73}{2400}$ and dec. =

2400) 73.00 (.030416

7200

10000

9600

4000

2400

16000

14400

1600

16000

(Continued on next page.)

(2 Continued.)

(3) $\cdot 36$ of a guinea = $\frac{36}{100} = \frac{9}{25}$ of a guinea.

25) 9

21

189 (7s. $6\frac{1}{2}$ d.

175

14

12

168

150

 $\frac{18}{25}$ $\therefore \cdot 36$ of a guinea = 7s. $6\frac{1}{2}$ d.and $\cdot 36$ of a £ = 7s. $3\frac{3}{4}$ d. $\therefore \cdot 36$ of a guinea is the greater.(4) 7s. $6\frac{1}{2}$ d. - 7s. $3\frac{3}{4}$ d. = $3\frac{1}{4}$ d.

(3) Int. of \$100 for 15 mo's at 5 per cent. = \$6.25.

\$106.25 : \$552.50 :: \$100 : required sum.

 \therefore Sum required = $\$ \frac{100 \times 552.50}{106.25} = \520 .(4) Number of sq. ft. on the walls = $143 \times 3 \times 2 = 858$ This is obtained from $(2 \text{ length} + 2 \text{ breadth}) \times 11$. $\therefore (2 \text{ length} + 2 \text{ breadth}) \times 11 = 858$.or $2 \text{ length} + 2 \text{ breadth} = 78$; but length = 2 breadth. $\therefore 3 \text{ breadth} = 78$. \therefore breadth = 26 ft. and length = 26 ft.No. of sq. ft. in floor = $26 \times 26 = 676$, or 37 sq. yds.

5 sq. ft.

(5) From 9 A. M. on Tuesday till 11 A. M. on Wednesday there are 26 hours, during which time the slow clock loses 10 minutes.

Also from 11 A. M. till 9 P. M. on Wednesday there are 10 hours.

26 hours : 10 hours :: 10 minutes : No. of minutes
which the slow clock loses in 10 hours = $\frac{10 \times 10}{26}$ min. =3 minutes, $50\frac{2}{3}$ seconds. \therefore The clock must be put on 10 minutes + 3 minutes,
 $50\frac{2}{3}$ seconds = 13 minutes, $50\frac{2}{3}$ seconds.

(6) 43 shares at $\text{£}11\frac{1}{2} = \text{£}494\frac{1}{2}$.

$\therefore 128 : 494\frac{1}{2} :: 100 \text{ stock} : \text{stock required.}$

$\therefore \text{Stock required} = \frac{494\frac{1}{2} \times 100}{128} = 386\frac{3}{4}$.

Annual income therefrom at 6 per cent. = $\text{£}23 \text{ 3s. } 7\frac{1}{2}\text{d.}$

PAPER IV.

(1) (1) $\frac{1}{5} + \frac{2}{3} + \frac{1}{35} + \frac{5}{21} = \frac{21}{105} + \frac{70}{105} + \frac{3}{105} + \frac{25}{105} = \frac{100}{105} = 1\frac{2}{21}$
 $1\frac{2}{21}$ of $\frac{4}{27} = \frac{5}{3} \times \frac{4}{27} = \frac{20}{81}$ $\frac{5}{3} \times \frac{36}{25} = \frac{12}{5}$. \therefore Fraction required is

$$\frac{1\frac{2}{21}}{1\frac{2}{5}} = \frac{\frac{17}{21}}{\frac{12}{5}} = \frac{17}{15} \times \frac{5}{12} = \frac{17}{36}$$

(2) $\cdot 027$ $3\cdot330$ ($123\frac{1}{2}$
 27

63

54

90

81

$\therefore \cdot 027$ can be taken 123 times from $\frac{9}{27} = \frac{1}{3}$ $3\cdot33$ and the fraction remaining is $\frac{1}{3}$.

(2) Each person received $\text{£}3 \text{ 3s. } 4\frac{1}{2}\text{d.}$ \therefore The 43 persons received $\text{£}3 \text{ 3s. } 4\frac{1}{2}\text{d.} \times 43 = \text{£}136 \text{ 5s. } 1\frac{1}{2}\text{d.}$

Then $(\text{£}1 - 6\text{d.}) : \text{£}1 :: \text{£}136 \text{ 5s. } 1\frac{1}{2}\text{d.} : \text{original am't.}$

Or $19\text{s. } 6\text{d.} : \text{£}1 :: \text{£}136 \text{ 5s. } 1\frac{1}{2}\text{d.} : \text{original am't.}$

\therefore Original amount = $\frac{65403 \times 40}{39}$ half pence = 67080

half pence = $\text{£}139 \text{ 15s.}$

(3) (1) 13 cwt. 2 qrs. 19 lbs. : 41 cwt., 1 lb. } $\therefore \text{£}4 \text{ 17s.}$
 $35 : 49$

6d. : required amount.

Or 1531 lbs. : 4593 lbs. } $\therefore 1170\text{d.} : \text{required amount}$
 $35 : 49$

in pence.

$\therefore \text{Am't} = \frac{1170 \times 4593 \times 49}{1531 \times 35} \text{d.} = 4914\text{d.} = \text{£}20 \text{ 9s. } 6\text{d.}$

(2) The bankrupt owes D \$2085—(\$235 + \$325 + \$525)
 $= \$2085 - \$1085 = \$1000$.

\$1000 : \$1 :: \$525 : required payment in the \$.

\therefore Payment in the \$ = $\$ \frac{525 \times 1}{1000} = 52\frac{1}{2}$ cts.

(4) £112½ : 45s. :: £100 : original cost per dozen.

\therefore Original cost per doz. = $\frac{2000 \times 45}{2250}$ s. = 40s.

Since there are 52 dozen in a butt, the average cost for a butt will be (40×52) s. = £104; and for three butts the cost will be $\pounds(104 \times 3) = \pounds312$. But the first and second butts together cost $\pounds(120 + 110) = \pounds230$. \therefore The third butt costs $\pounds312 - \pounds230 = \pounds82$.

(5) 2 Turkeys and 9 fowls cost £2 18s. 6d.

\therefore 10 turkeys and 45 fowls cost £14 12s. 6d.; also 5 turkeys and 2 fowls cost £4 8s. 2d..

\therefore 10 turkeys and 4 fowls cost £8 16s. 4d.

But 10 turkeys and 45 fowls cost £14 12s. 6d.

\therefore 41 fowls cost £5 16s. 2d., and one fowl costs 2s. 10d.

And if 2 turkeys and 9 fowls cost £2 18s. 6d., 2 turkeys will cost £2 18s. 6d. — $(9 \times 2$ s. 10d.) = £2 18s. 6d. —

£1 5s. 6d. = £1 13s. \therefore 1 Turkey will cost £1 13s. $\div 2$ = 16s. 6d.

(6) Area of field = 13 ac., 81 yds. = 63001 sq. yds.

\therefore One side of field = $\sqrt{63001}$ yds. = 251 yds. \therefore Perimeter of field = 251 yds. $\times 4 = 1004$ yds.

3½ mls. : 1004 yds. :: 60 min. : required time.

\therefore Required time = $\frac{60 \times 1004}{5866\frac{2}{3}}$ min. = $\frac{60 \times 3012}{17600}$ min. =

10 min. 16½ sec.







1158



